Electrical Review

Vol. 79—No. 20. CHICAGO, SATURDAY, NOVEMBER 12, 1921. Page 721.

Ornamental Street Lighting of Modern Design

Good Lighting Promotes Improvements and Increases Property Values—Improved Efficiency Characteristic of Developments—Paper Before American Society for Municipal Improvements

By L. A. S. WOOD

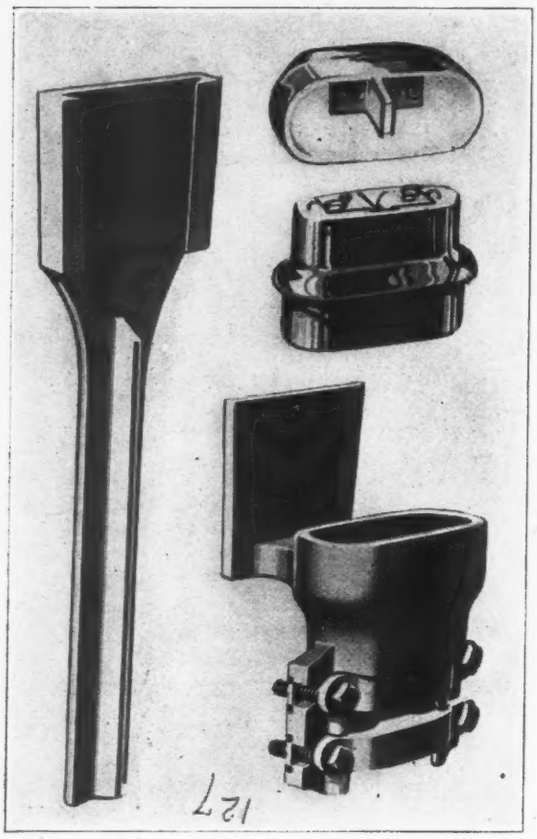
George Cutter Works, Westinghouse Electric & Manufacturing Co., South Bend, Ind.

The lighting of our streets at night is a vital municipal issue, and adequate illumination besides being a convenience is in addition a protective necessity to every community. Good lighting is an indication of prosperity, and an investment in a well-designed ornamental street lighting system returns large dividends to the tax payers in advanced real estate values. Good street lighting creates a psychological impression of thrift and progress, advancing civic pride, attracting favorable publicity, and promoting other improvements. It assists the fire and police departments, facilitates congested traffic, and decreases crime.

In the early days of electricity street lighting design was a simple problem the solution of which generally took the form of a suspended arc lamp at street intersections. With the growth of the "City Beautiful" idea, however, and the demand for lighting systems of a more ornamental character which eliminate unsightly overhead equipment, many factors not provided for in the earlier systems have to be consid-

View Showing Combination of Ornamental Trolley Pole and Street Lighting Equipment of Pleasing Design on Busy City Street.

ered. The more important of these are the size of the city, the character of the buildings, the presence of foliage on the streets, and the local conditions controlling the distribution of energy.



View of Separated Parts of Lamp Post Disconnect Device.

The standard of illumination on our streets was set by the earlier types of open carbon arc lamps which were later replaced by an improved type having a longer burning period and known as the inclosed carbon arc lamp. This latter unit was not so efficient as the open arc and its substitution in place of the earlier type tended to decrease the standard of illumination. It will often be found that the energy consumed in lighting a comparatively small room in a public building is greater than that consumed in lighting an entire mile of the average city street with ordinary pendant units. Street lighting rates with few exceptions have remained practically constant for many years in spite of the fact that there has been a large advance in the costs of material and labor. The per capita cost of street lighting is generally low, and there are few cities spending over $3 per capita. The average for the 50 best lighted cities is about $2, and for the whole of the United States not more than $0.71 per capita.

Requirements of a Modern Ornamental Street Lighting System.

Since the introduction of the high-efficiency type C incandescent lamp which has revolutionized street lighting, eliminating the ornamental cluster post of earlier days, and relegating the arc lamp to the museum, development in ornamental street lighting has favored the single-light post equipped with suitable lighting unit or "post top" to distribute and direct the light on the plane of illumination. The first requirement of an ornamental street lighting system is that while efficiently illuminating the streets during the hours of darkness it should be inconspicuous in the day time, blending harmoniously with the architecture of the surrounding buildings.

Another important requirement of good street lighting is that the intensity should be graduated in accordance with the conditions of the various localities. The flexibility of the modern system renders it particularly suitable for this class of work. Until the public became aroused to the necessity of well-designed and uniform systems of ornamental street lighting progressive merchants installed at their own expense systems of ornamental posts or "White Ways" which often resulted in the installation of posts of various designs in different parts of the same city. This activity on the part of the merchants should be carefully directed by the municipal authorities, and the uncontrolled installation of "White Ways" should be discouraged. An ornamental street lighting system should be considered as part of a plan to beautify the city as a whole and not as a means of advertising one section, perhaps to the detriment of some other locality.

There are various methods of promoting the installation of ornamental lighting systems, but the most successful have been through the chambers of commerce or commercial clubs—municipalities are, as a rule, reluctant to consider such lighting until there is a publicly expressed demand. In a number of states there are existing laws which permit the establishment of assessment districts for the purpose of taxing abutting property for the installation of special lighting. In such cases usually 51% of the frontage involved must be signed up to make the petition effective. Street lighting improvement acts have generally assisted the progress of ornamental street lighting, and where available should be used. The assessment becomes a taxation and the contract is between the city and the central station, thus insuring a uniform installation with continuity of service under the control of the municipality.

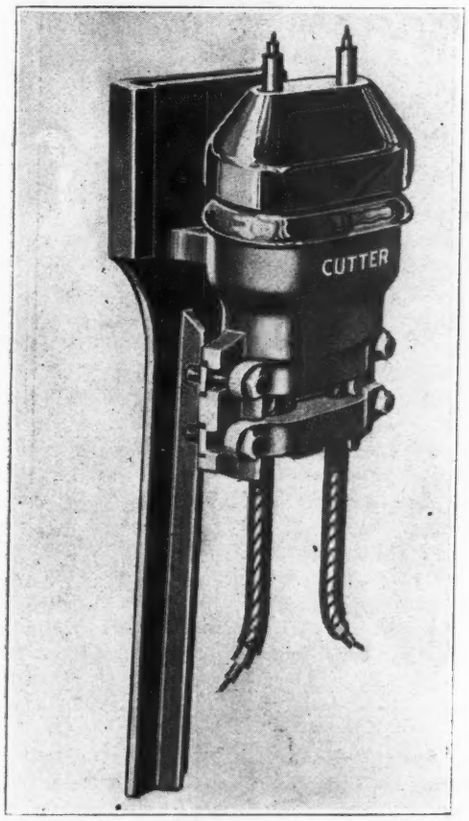
The assessment of property owners for the upkeep of lighting installations is not new, and the following extract from "Municipal Government" by Frank J. Goodnow, L. L. D., describing Paris in 1666, is of interest:

"The expense of lighting the streets was defrayed also from the receipts of a tax imposed on the householders. Mildmay says: 'Two persons are generally contracted with for this undertaking—the one to find the lanthorns, cords and pullies, and the other to supply the candles, for the streets are here illuminated by hanging lanthorns on the middle of a cord that reaches across the street and is fixed to pullies on each side at about 15 ft. high and about 15 yds. distance from one another. There are 65 lanthorns and consequently as many candles consumed each time they are lighted, which is only 20 times a month, being laid aside during the moon-light nights; and are never lighted but from the last day of September until the first day of April each year, being taken down and set apart during all

the summer months.' Elections were held annually in each quarter of the city by the householders. The persons elected each had charge of 15 lanterns and paid, as Mildmay puts it, 'Some menial servant or poor housekeeper in the same street to perform the duty; accordingly every evening as soon as it begins to grow dark the commissary sends out a person ringing a hand bell through the streets of the quarter to give notice—as in the morning for cleaning the streets, so now for lighting them—upon which each lanterniers servant immediately sallies out and, having a key to the iron box in which the end of every cord is fastened on the sides of the streets, lets down the lanthorn hanging on the same and fixing his lighted candle therein draws it up again. Thus, everyone having only 15 lanthorns under his care, the whole city is illuminated in a very short space after notice, though the light itself is indeed a very indifferent one.'"

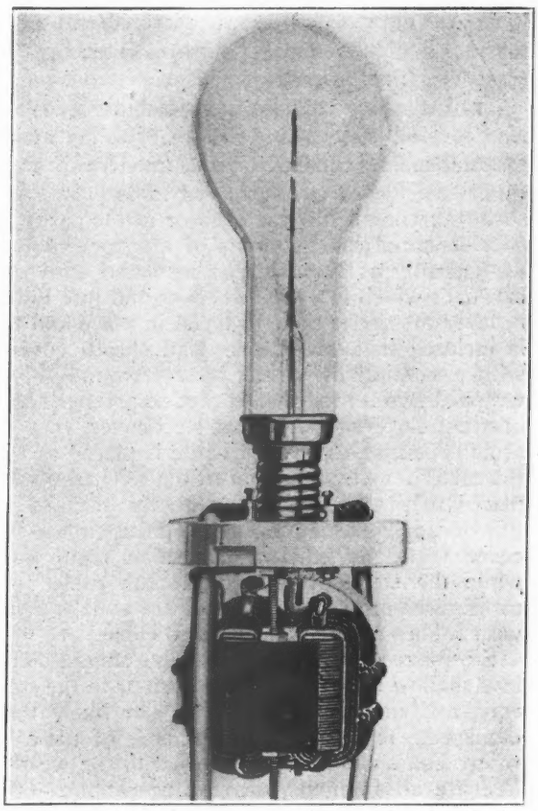
System of Operation Employed in Modern Street Lighting Practice.

Owing to its flexibility the type C lamp is peculiarly adapted to ornamental street lighting, and, when operated on a constant-current series system, it affords an efficient and economical street lighting unit that is easily installed and controlled, giving a range of from 600 lumens (60 cp.) to 25,000 lumens (2500 cp.). Any size



Disconnect for Installation in Base of Ornamental Lamp Post.

lamp within this range may be operated in series on the same circuit without changes in the regulating equipment at the central station, and with suitable inclosing glassware a soft diffused illumination or a brilliant sparkling light without glare



Reactance Coil Installed Immediately Below Lamp Socket.

may be obtained. The regulating equipment generally consists of moving-coil type constant-current regulating transformers and control panels which limit the current in the circuits, safeguarding the lamps against surges and at the same time insuring that sufficient current will flow through the lamps at all times to maintain the rated candle power. In addition to regulating equipment of the station-type moving coil regulating transformers have been designed suitable for mounting on poles at any point in a high-tension distribution network, thus permitting an ornamental lighting system to be connected to a high-tension line without the necessity of running special lighting circuits back to the substation. This improvement in regulating apparatus materially reduces the cost of installing ornamental lighting systems at a distance from the substation. Another method of control for series tungsten lighting is the adjuster or reactance socket system. This is generally used for small groups of lighting units and is operated from a constant-potential transformer with a reactance coil connected in parallel with each socket. When a lamp burns out the current is "forced" through the reactance coil, introducing an impedance in the line equivalent to the energy absorbed by the lamp, thus maintaining the circuit current at a constant value.

Earlier types of cluster posts were usually operated on multiple systems, but, while there are still some ornamental lighting systems installed in multiple, the series system is the one now generally adopted. This condition has made the selection of ornamental street lighting equipment a matter for the engineer's serious consideration owing to the fact that the equipment,

unlike the old cluster posts, is operated on a high-tension system requiring fixtures specially designed for this purpose.

Until the introduction of steel-armored and lead-covered cable it was customary to lay underground cable in conduits, but modern practice favors the use of steel armored cable buried in a shallow trench below the curb or in the parkway. Steel-armored cable consists of a copper conductor (usually of No. 8 gage) insulated with rubber, over which is a braided cover and jute filling. A layer of tape is then wrapped in place and this is inclosed in a continuous lead sheath covered with a coating of tarred jute. Around this is wrapped two layers of steel tape so arranged as to insure the overlapping of the steel cover when the cable is bent. A serving of jute is placed around the cable to give protection to the steel tape when placed in the ground. If properly installed the life of this cable is almost indefinite, as the lead cover forms an efficient protection from water while the steel armor protects the cable from mechanical injury. The posts are usually wired with rubber-covered and braided cable.

Steel-armored lead-covered cable should be laid in a shallow trench under the curb or in the parkway, and in this position it is not likely to be damaged. It is important that ends of the cable, where cut, should not be exposed to the weather. We are all familiar with the precautions taken by cable manufacturers to seal the ends of the cable before it leaves the factory, but, unfortunately, in some cases, very little care is exercised in this direction when the cable is installed. It is quite common during the installation of ornamental lighting systems to see the ends of the underground cable projecting through the ground and exposed to all weathers until the posts are installed and connected, with the result that faults are likely to develop at an early date and the installation becomes a source of trouble and expense.

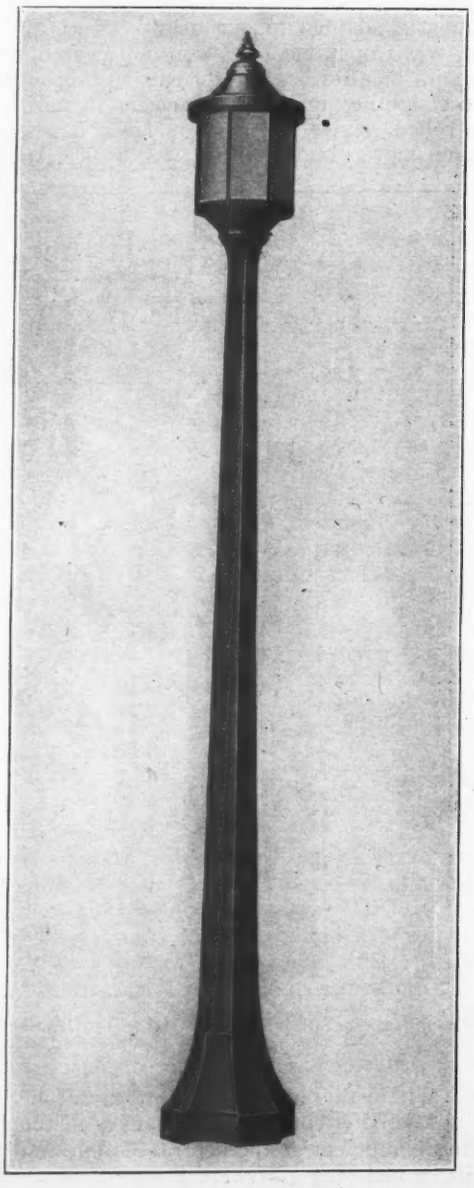
The best way to install armored cable is to lay it in a prepared trench, leaving a loop at the location of each post sufficiently long to reach the terminal of the disconnecting device in the base of the post, and to pour cement around the loop to form the foundation for the post. This is a more satisfactory method than the one usually used of making the post foundations first with the conduit elbows for the cable to be drawn through, as it leaves the cable intact until the time the connections are made in the base of the post.

A disconnecting pothead should be used in the base of the post, and this should be of such design as to thoroughly seal the ends of the steel armored cable and efficiently bond and ground the steel armor and lead covers. It should also be designed so that the post wiring is automatically disconnected from the underground system and the circuit in the base of post reestablished by a short-circuiting device in the event of the post being accidentally broken. It is desirable that a device be used in the top of the post for relieving the terminals of the lamp socket from the strain of the weight of the cable used in wiring the post.

In the constant-current series system of operation the high-tension current is carried up the post, and, although when properly installed this is not objectionable, several cities have preferred to use a safety coil in the base of the post so that a voltage equivalent to the voltage of the lamp only is carried up the post. Safety coils have been designed equipped with disconnecting potheads which have all the advantages of the latter device coupled with the safety feature of low-voltage in the post.

Part-Night Circuits Arranged by Division of System Into Two Parts.

Occasionally in the interest of economy it is found desirable to decrease the illumination on the streets after midnight when only protective lighting is required. This is best accomplished by dividing the lighting system into two circuits, one operating the all-night lamps and one operating the part-night lamps. For this purpose two single conductor cables may be laid in the same trench connecting with alternate lamps, or any other combination desired. If preferred, a twin-conductor cable may be used.



Single-Unit Standard for Use With High-Power Lamps.

In many of the larger cities will be found some exceptionally wide and important streets which will require special treatment; in general, however, for the purpose of determining the correct size of lamp with the best spacing and mounting height the streets may be designated as important business streets, side streets, or residence streets. The accompanying table gives approximate data on the subject of street classification which, however, may be varied to meet local requirements. In the important business streets and side streets the ornamental posts should be set symmetrically opposite each other on either side of the streets, while in residence districts the posts should be staggered. For exceptionally wide and important streets a greater intensity of illumination is required with high mounting, and for this purpose 2-light ornamental posts for use with 15,000 and 25,000-lumen lamps have been developed.

The Use of Trolley Poles as Supports for Modern Lighting Units.

On streets where trolley poles are in service the best method of lighting is by the use of ornamental trolley brackets with suitable lighting units with either single or double arms which may be attached to the poles, presenting an attractive appearance and eliminating the necessity of cluttering up the streets with additional posts. Another method of adapting trolley poles as ornamental lighting units is to incase the pole in an ornamental castiron shell with ornamental brackets attached. An attractive unit has been designed with double brackets immediately below the trolley span wire and a single light at the top. The span wire is attached to the trolley pole through a hole provided in the capital of the top lighting unit.

Ornamental posts may be divided into three classes as castiron, concrete and pressed-steel poles. The earliest ornamental castiron post the history of which is preserved was installed in the Taj Mahal, Delhi, India, upwards of 1600 yrs. ago and stands today a monument to the durability and lasting qualities of castiron. Castiron posts will not corrode; neither will they chip or crack under extremes of temperature. They are designed to withstand severe shocks, such as might be received in ordinary street traffic, and present the slender and graceful appearance so desirable in ornamental street lighting units.

Concrete is one of the most durable materials used in construction work, but it has been found that ornamental posts of this type must be of heavy and substantial construction to withstand extremes of temperature. Unless manufactured with care concrete posts will be found to chip and crack in Northern climates.

Pressed-steel posts generally consist of a shaft of corrugated pressed steel mounted on castiron foundation, with an iron capital, the whole bolted together with three tie rods passing through the center of the shaft. This type of post, owing to its construction, presents a massive appearance, but the shaft is readily dented and bent by shocks which would leave castiron posts unaffected.

Until about the year 1913 the filaments of all commercial incandescent lamps were operated in bulbs from which practically all the air and gases had been removed. The evacuation of the bulb prevented the filament from being consumed by the oxygen of the air and also prevented the loss of heat by convection. As the temperature of the filament is raised the light emitted increases much more rapidly than the energy consumed, but, on the other hand, the rate of evaporation of the filament is increased. In the type C lamp the rate of evaporation is reduced by the introduction into the bulb of inert gases, thus permitting the use of a higher operating temperature. Convection losses are reduced by the use of a concentrated type of filament, and this renders the use of such lamps specially suitable for street lighting purposes.

Series a-c. arc lamps were operated on circuits of either 6.6 or 7.5 amperes, and in consequence series lighting regulating equipment designed for these ratings became standardized throughout the country. Series incandescent lamps were made for use on such circuits in ranges of from 60 cp. to 1000 cp., but the larger lamps did not come into commercial use until the high-efficiency type C lamps operating at 15 and 20 amperes were introduced. These lamps, owing to the increased size and rugged construction of the filament, have a longer lamp life than the straight series type and are generally adopted for ornamental street lighting systems except in residence districts.

Since the standard rating of series a-c. circuits is either 6.6 or 7.5 amperes individual auto-transformers to step up from the line current to that required by the lamp have been designed, and these are generally mounted in the post top immediately below the socket. In cases where a safety coil is installed in the base of the post the auto-transformer is omitted and the safety coil serves as the step-up transformer. The high-efficiency type C lamps are made in the sizes shown in an accompanying table.

TABULATION OF DATA RELATIVE TO TYPE C LAMPS FOR STREET LIGHTING SERVICE.

Lumens.	Amperes.	Average volts.	Watts.	Light center lengths in ins.
4,000	15	14.9	223.5	9.5
6,000	20	15.5	310.0	9.5
10,000	20	25.9	518.0	9.5
15,000	20	37.6	752.0	9.5
25,000	20	60.7	1,214.0	9.5

Note—The nominal candlepower of these lamps is one-tenth their lumen rating.

The problem of street lighting is not like that of lighting a room where the ceiling and walls reflect the undirected light, and provision should be made in the unit itself to direct the light emitted above the horizontal to the plane of illumination. With ornamental post lighting, however, it is desirable that a small amount of light from the upper hemisphere should be directed against the fronts of adjacent buildings, and that glare should be eliminated as far as possible. Glare within the range of vision of the pedestrian or vehicle driver should always be avoided. It causes the pupil of the eye to contract in an effort to protect the delicate mechanism of the retina, thus preventing the observer from seeing as well as he would be able to do with a light source of lower intensity but with more perfect diffusion. We are conscious of this phenomenon when entering a moving picture theater from a street flooded with sunlight—at first no details can be seen,

but gradually when the eye becomes accustomed to the light, or in other words when the pupil becomes dilated permitting more light to enter the eye, the interior details become visible.

Recently Developed Lighting Unit Suitable for Large Lamps.

The problem of designing lighting units of high intensity with a minimum of glare has been solved very satisfactorily by the "Reflecto-Lux" post tops recently introduced. These units are the very latest in ornamental post tops, and they have been specially designed to distribute a flood of light on the streets with a small amount upwards to illuminate the fronts of adjacent buildings. The units have been developed for "Super White Way" lighting with 10,000 and 25,000-lumen lamps, or they may be used with smaller lamps if desired. The light emitted by the unit is brilliant and sparkling, and the panels of ribbed glass assist in diffusion and in the elimination of glare.

The distribution is obtained by upper and lower parabolic reflectors which direct the light outwards; in addition, a portion of the light in the upper hemisphere is redirected by an opal glass band around the upper portion of the lamp, or by a band of enamel on the lamp itself. In the post top the lamp burns in a tip-up position and is easily accessible for cleaning through the top cover which is hinged. With the variety of ornamental street lighting fixtures now available, the possibilities of efficient and artistic lighting for the "City Beautiful" are unlimited, and public spirited men who are guiding the destinies of American cities will find an easy solution to their problems by consulting the manufacturers who have devoted many years of research to the design of suitable apparatus.

TABLE SHOWING CLASSIFICATION OF STREETS AND RECOMMENDED ILLUMINATION.

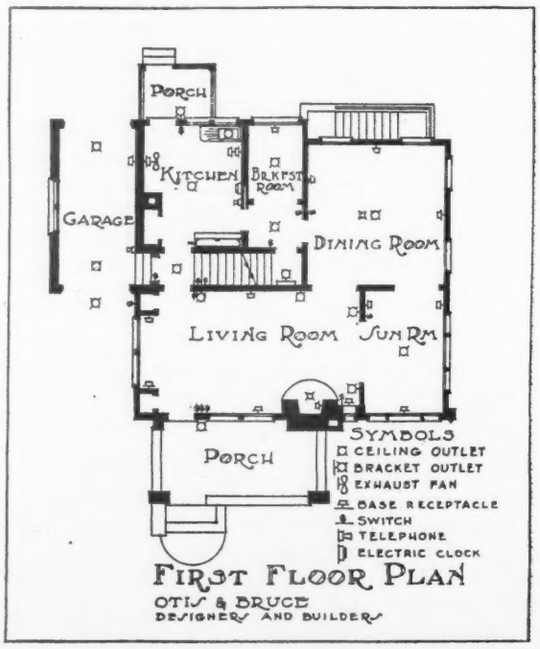
Type of street.	Size of lamp in lumens.	Spacing in ft.	Mounting height in ft.
Important business	6,000 to 15,000	50 to 75	12.5 to 15.0
Side	2,500 to 4,000	75 to 100	11.5 to 13.5
Residence	1,000 to 2,500	150 to 250	10.6

ELECTRIC HOME IN LOUISVILLE IS GREAT SUCCESS.

Complete Installation of Wiring and Equipment Made to Demonstrate Conveniences of Electricity to the Public.

The 8-room house with garage attached pictured in the accompanying illustration was built under the direction of the Electric Club of Louisville, Ky., as an educational project to demonstrate to the public that "keeping house electrically" is no idle dream, but an actual fact which may be duplicated in any home by the installation of ample electric wiring and the use of proper appliances. It is completely furnished as a model home with furniture, decorations, rugs, hangings, etc., in harmony with the type of house. Connections are provided in the different rooms in the "Electric Home" for the following electrical appliances, which are installed ready for use: *Living room*—Electric clock, electric fan, electric victrola, electric piano, electric fire-log, vacuum sweeper, and electric floor polisher. *Sun room*—Air heater, electric cigar lighter, and vacuum sweeper. *Dining room*—Urn-type percolator, chafing dish, and electric fan. *Breakfast room*—Post-type percolator, toaster, and grill. *Kitchen*—Dish washer, electric range, fan, electric clock, electric flatiron, utility motor, automatic electric refrigerator, fireless cooker, waffle iron, and drink mixer. *Bed rooms*—Curling iron and comb, immersion water heater, milk warmer, air heater, warming pad, vibrator, fan, sewing machine, electric clock, and violet ray machine. *Bath room*—Air heater and hair dryer. *Basement*—Ice cream freezer, electric churn, washing machine, ironing machine, clothes dryer, electric fan, electric water heater, electric flatiron, and electric furnace heat regulator. *Garage*—Rectifier (for battery charging), electric soldering iron, electric drill, and air compressor.

Home Built for Demonstration Purposes by the Electric Club of Louisville, Ky.



First-Floor Plan of Louisville (Ky.) Electric Home.

Intercommunicating telephones connect the garage, basement, kitchen, and second floor hall. Electric clocks operate synchronously with a master clock in the main generating plant of the Louisville Gas & Electric Co. and furnish the correct time entirely independent of personal attention. The Electric Club issued an 8-page illustrated booklet describing the "Electric Home," which was distributed to visitors during the exhibition.

Show Window Illumination With Special Equipment

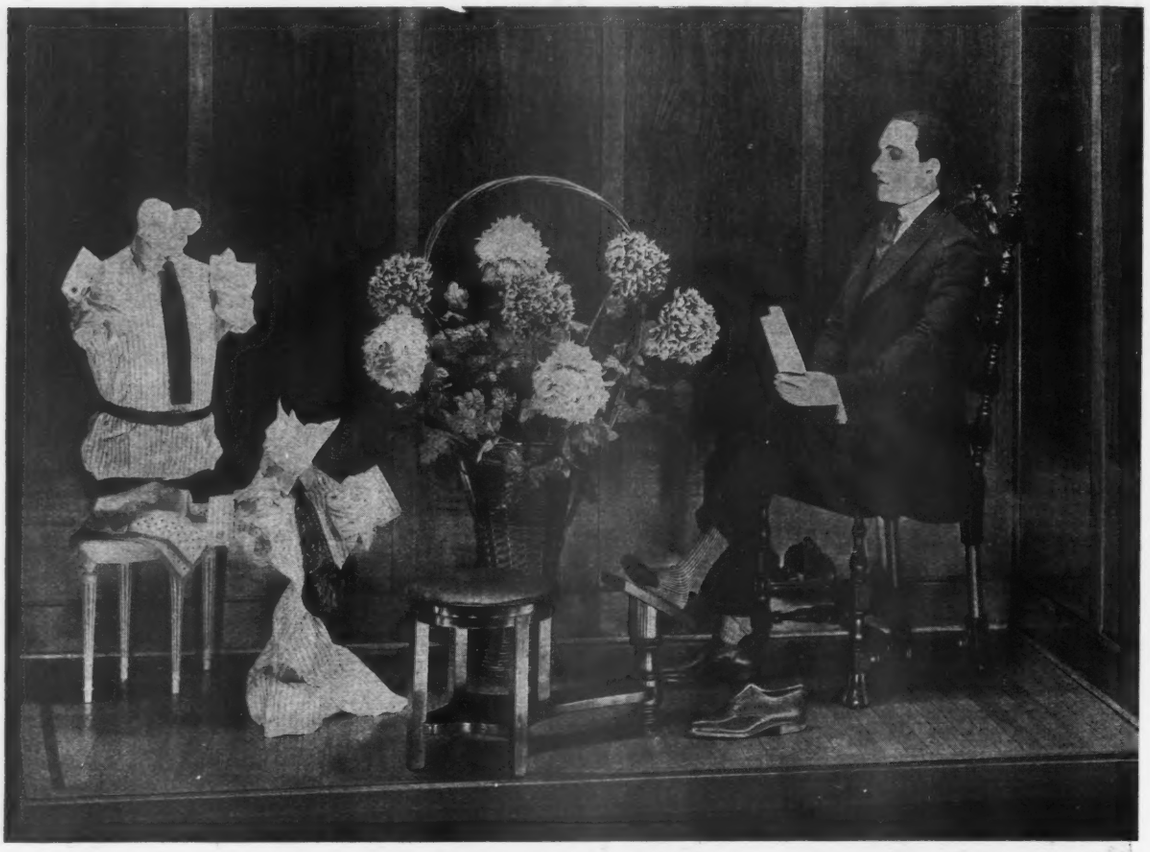
Footlights Combined With Spotlight and Standard Devices Produce Lighting Effects Suitable to Give Prominence to Window and to Goods on Display — Colored Light Has Special Appeal

By C. E. JOHNSON
National X-Ray Reflector Co., Chicago.

Many lighting effects on holiday displays are possible, using footlights, overhead reflectors, spotlights and colors. The idea of lighting every scene on the stage in the same way has long been discarded. Now, we enjoy a comedy, opera or drama not alone because of the talent, but because the lighting makes us feel the spirit of the idea that the stage director is trying to produce. Show window displays are similar to stage settings. The show window is the merchant's stage where his merchandi e is attractively arranged to appeal to the shoppers' desire to have—to buy, if you please. The many window displays are as different as stage settings, and each can be made effective in its particular appeal if properly lighted. There are several ways in which this can be done; i.e., with footlights, reflectors, spotlights and color equipment.

Window footlights placed at the front of the window near the plate glass are used either in combination with reflectors mounted at the ceiling or alone. Their purpose in the show windows.

Show Window Lighted From Units Mounted Near the Ceiling—Note Distribution of Light on Display and on the Entire Background.



Show Window Lighted by Combination of Footlights at the Floor Near the Plate Glass and Individual Silver-Mirrored Reflectors at Ceiling.

Show Window Lighted by X-Ray Window Footlights Only—Note Effect of Dark Appearing Background.

the same as on the stage, is to bring all details into sharp relief and eliminate shadows on the front of the setting. Especially where wax figures and forms are employed can footlights be used to advantage. The combination of footlights and reflectors overhead gives an evenness of lighting although for many displays footlights without overhead lighting are used. This type of lighting brings the display nearer the front of the window into sharp relief against a darker background and is often used to light a display in sharp contrast to other show windows.

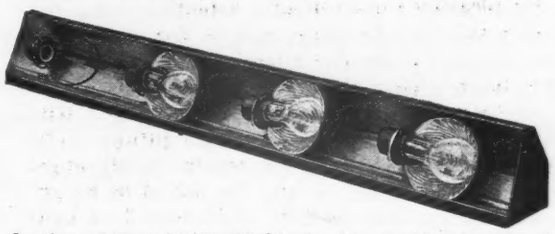
Two general types of show window footlights are in use, both having individual silver-mirrored reflectors for the proper distribution of light. They are made in sizes for use with lamps rated at from 15 to 150 watts. They are inconspicuous and are finished in the same color as the window woodwork. A portable type of X-Ray footlight furnished in lengths of 4, 8 and 12 ft. can be moved from one window to another. The disappearing type of footlight is built in on a section of the under side of the floor of the window. This is hinged, and the floor with the footlight attached to the under side is raised like a trap door. A system of simple gears is arranged for raising or lowering the equipment from outside the window. When this type of footlight is not in use it is lowered into place so that the floor has the same appearance as that in any other window.

For average displays individual silver-mirrored reflectors mounted at the transom bar or ceiling give a high intensity of light. This form of show window lighting in universal use has been developed to such an extent, however, that for contrast something else besides increasing intensities is necessary. Tints of color in lighting on the stage increase public enthusiasm for the play, the right shades of color make the entire setting blend; and the play "goes over the footlight" a big success. This same harmony in show window lighting is especially desirable during the holiday season. The same white lighting does not typify the spirit of every display, but tints or color

Color-Ray Unit Attached to Silver-Mirrored Window Lighting Reflector.

blended to harmonize with the setting will give the means of making the light fit in as a real part of the scene. Every show window that arouses keen interest creates sales. It makes a lasting impression on the minds of those who see it. Color lighting will cause a window display to remain in the memory of shoppers just as color effects help us to remember some details of a theatrical production.

Color effects from reflectors mounted at the



Section of Portable Footlights for Use in Illumination of Show Windows.

ceiling are produced by using a Color-Ray unit provided with interchangeable color slides in standard shades of red, green, blue and amber. Color effects with footlights are made by using dipped tungsten type B lamps or color mediums with type C lamps. In general, tints of colors are best suited to most displays, color slides being alternated to secure the particular tint or effect wanted. Displays using combinations of single colors in each section of the window are also very effective.

From the four primary colors, red, blue, green

X-Ray Spotlight Supported From an Ordinary Reflector Holder.

and amber, the lighting in any window may be tinted in almost any shade. Red is the most "lively" color in creating "atmosphere." In lighter tints (made by mixing with the white light of the lamps or with other colors) it produces a delightful gently stimulating effect. Rose tints (made by mixing red and blue colors) are soft and inviting, being appropriate for settings with home furnishings, interiors, etc. Blue is a cool color, soothing and subduing. It suggests coldness, the night, moonlight and dignity. Blue is appropriate for white goods, silver, enamel ware or winter scenes. When shaded to purple it suggests splendor, luxury and dignity.

Green, the color of nature's garb, is cool and refreshing, suggesting ease and rest. It suggests life, youth, vigor, summer and the "outdoors." It is appropriate for displays of vacation supplies, sporting goods and rainy weather apparel. When

mixed with blue it suggests the quiet of winter. Yellow is associated with sunlight and is symbolic of light, happiness and springtime. It is the easiest color to work with in lighting window displays, and mixing other colors with it produces many pleasing tints for any display.

The spotlight concentrates attention upon the leading role on the stage, and so for show window displays particular attention may be attracted to some article by spotlighting. It has a particular use especially with color lighting. The spotlight shown here is adjustable to any angle and can be attached to the regular window reflector shade holder, or may be bolted to a convenient supporting surface. The spread of light is adjustable from the outside, and a color frame for use with a color medium is supplied. This is one of the most flexible spotlights on the market. The lighting of the holiday display with arrangements for variable effect should be planned now. The engineering department of any large manufacturer of this equipment will make suggestions gratis.

Nebraska and Iowa newspaper editors were entertained at an "electrically cooked" banquet at the power station of the Nebraska Power Co. in Omaha recently as guests of the electric company.

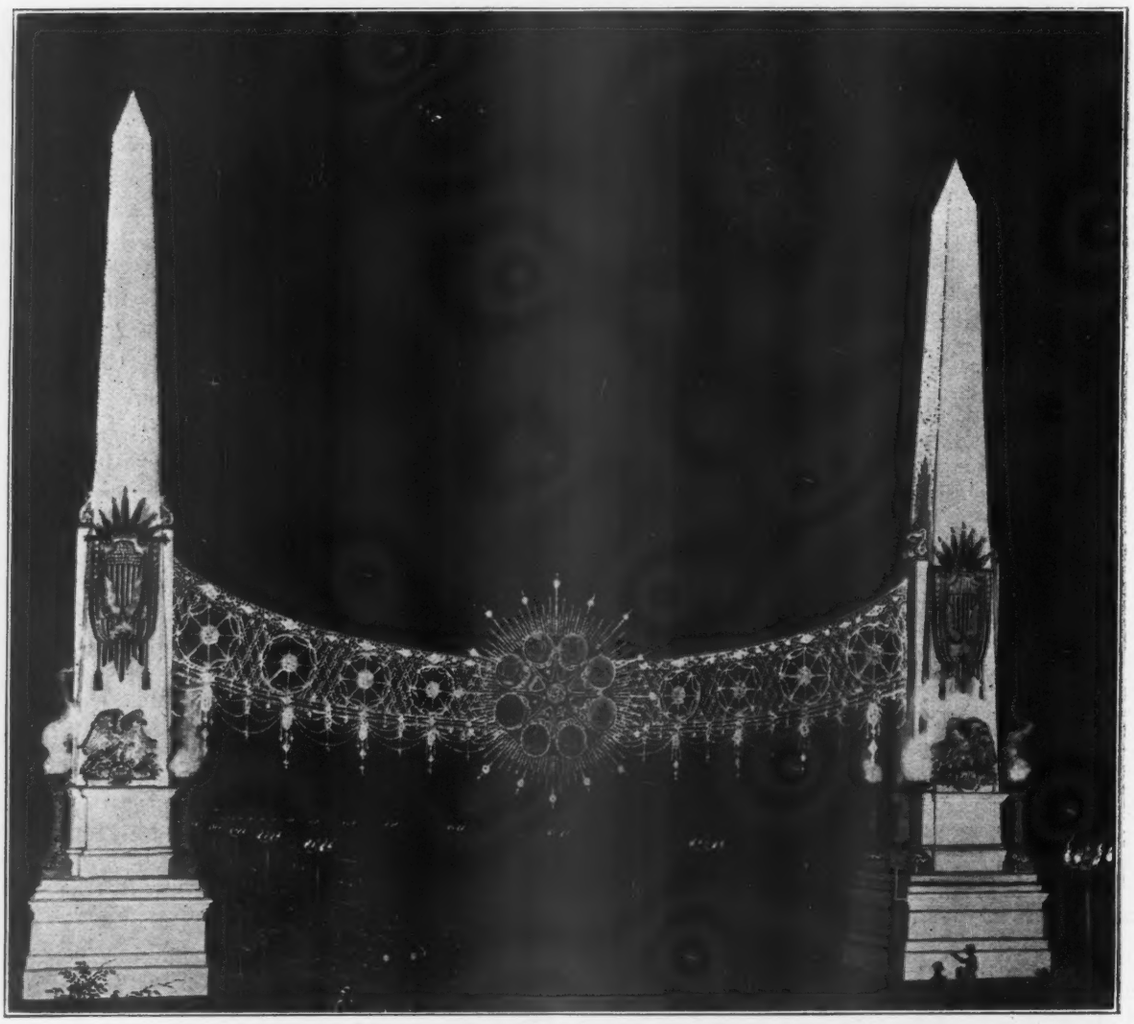
WYNONA (OKLA.) CITIZENS OPPOSE MUNICIPAL OWNERSHIP.

Citizens of Wynona, Okla., met recently with the city council to discuss the matter of securing an electric light plant for Wynona. Proposals were submitted by two private corporations and then the subject of a municipally owned plant was presented. The result is thus recorded in the Wynona *Record*:

"M. C. Huff, president of the council, then put a question before the meeting to find out how those present felt about a municipally owned electric service, or a corporation owned service. The vote was almost unanimous in favor of the corporation owned service. Following the vote adjournment was taken."

CINCINNATI BUILDING TO UTILIZE CENTRAL STATION SERVICE.

The Union Gas & Electric Co., of Cincinnati, has been awarded a contract for supplying electric light and power to the Keith Theater building, Cincinnati's newest and most modern office structure. This electric current will operate the elevators, furnish light for the hundreds of offices, illuminate the stage and interior of the theater and perform many other services.



Illuminated Arch Designed by W. D'A. Ryan of the General Electric Co. for the Armistice Day Celebration in Washington, D. C.

Wiring Systems for Lighting of Hotels and Clubs

Use of the Room, Location of Furniture, and Location of Outlets Important Factors in Wiring Design—Templates Facilitate the Work of Locating Switches—General Plan Depends on Details

By CLYDE P. TRUEAX

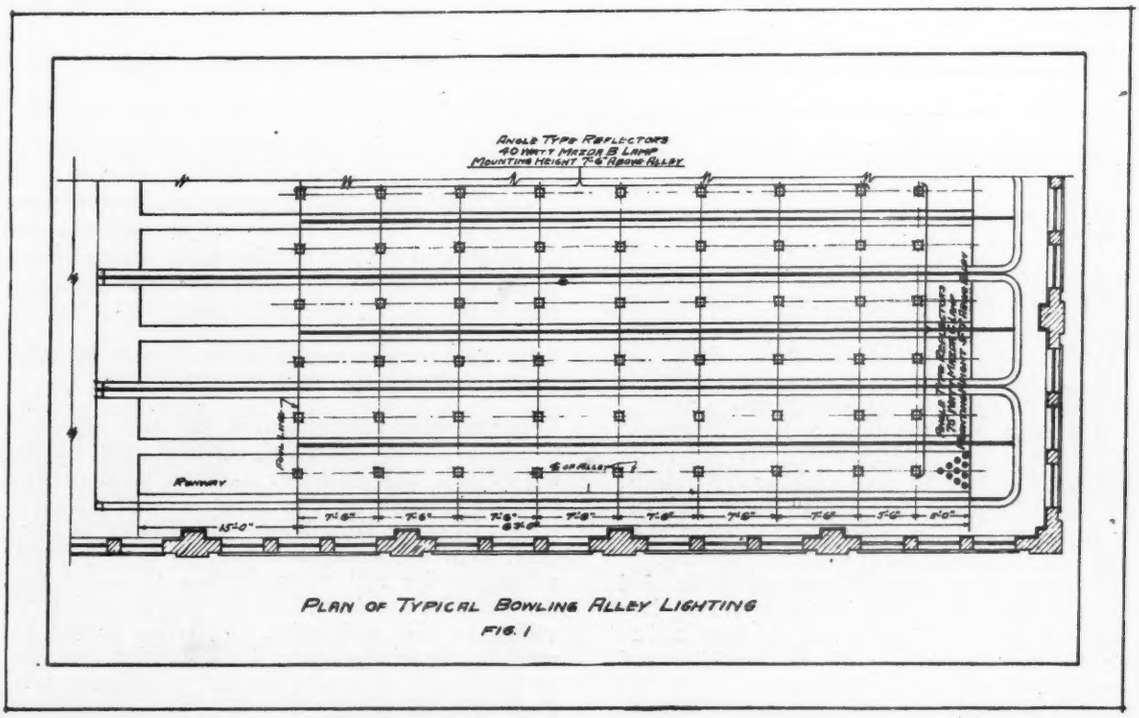
Electrical Engineer, Wolf, Sexton, Harper & Trueax, Inc., Engineers and Architects, Chicago.

To obtain satisfactory effects in artificial illumination the electric wiring must be designed to meet the requirements as a whole, and the individual requirements of each room to be illuminated without making the cost of installation excessive. In planning the wiring layout there are three main points to be considered: First, the use to which the room is to be put; secondly, the type and location of furniture or equipment; and thirdly, the location of outlet in adjoining rooms.

A study must be made of the requirements of each room and the scheme of lighting to be carried out in order to lay out in an economical manner the wiring for the various outlets. In some cases the ceiling light outlet will suffice, employing only general illumination. In a majority of cases, however, a combination of general and localized lighting is required which calls for both ceiling and wall bracket outlets, as well as outlets for baseboard receptacles, which can also be used for the attachment of the many electric appliances now being used.

The demand for a plentiful supply of baseboard receptacle outlets is growing, inasmuch as the trend of lighting practice, especially where the decorative and artistic value outweighs the purely efficient, is toward a larger number of light sources of relatively low intensity, rather than one or more of high intensity. This is particularly true in residence lighting where the use of floor, table, desk and bed lamps, together with electric candles and wall brackets, is supplanting to a great extent the former large central ceiling fixture. Then also these baseboard receptacles can be used for attaching various electric appliances such as heaters, fans, toasters, percolators, sewing machines, etc., thus serving in many instances a double purpose.

This being the case, it is advisable to make a careful study of the possible arrangements of furniture and fixtures in each room, with a view to making each outlet readily serve the maximum number of different groupings. The time required for such a study can be materially reduced by the use of small cardboard templates of the various pieces of furniture, cut to the same scale as the floor plan. With these and the floor plan a number of arrangements can be obtained, each time marking the most desirable spot for



PLAN OF TYPICAL BOWLING ALLEY LIGHTING

FIG. 1

base outlets and fixtures. Then after all dispositions have been made, locate base plugs and fixture outlets in places where they will coincide as nearly as possible with the most desirable points marked for the different group arrangements, that is, as nearly as possible at the "center" of each group of points. Owing to the size and architectural layout of some rooms, and the furniture and fixtures intended to be used therein, there can be but one arrangement, but in a great number of cases many and varied groupings may be obtained.

Hotels and clubs involve a wide variety of rooms for different uses, ranging from bath to banquet room, and consequently require many different types of lighting, and between these two extremes lie kitchen, serving room, dining room, grill, exchange or lounge, lobby, card room, rest room, billiard room, bowling alley, swimming pool, gymnasium, locker room, shooting range, corridor and bed room.

Features of Importance in Various Specific Locations.

In the lighting of the kitchen and serving room, utility is the predominating factor. An intensity value of 4 or 5-ft. candles should be provided, and the lighting fixtures should be of a type that permit of maintaining in a clean and efficient condition with a minimum of maintenance cost.

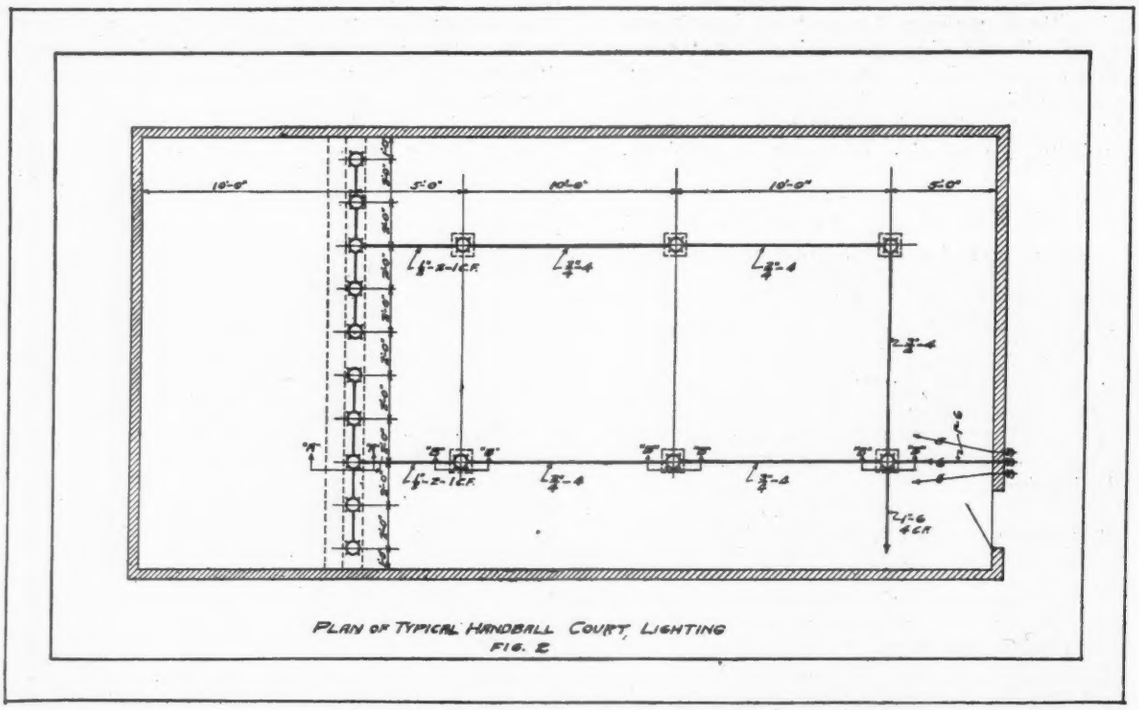
It is essential that the units be properly spaced with reference to the kitchen and serving room equipment in order to give satisfactory results. With few exceptions this applies more particularly to kitchen and serving room lighting than to any other room in hotel and club lighting.

For dining rooms, both private and public, and grills, ornamentation may be incorporated into the lighting fixture design to suit the taste and to work in harmoniously with the architectural treatment and the interior decoration.

Various methods may be employed in private dining room lighting. One arrangement which gives very pleasing results is the use of a central ceiling fixture of suitable design with wall brackets to match. Large dining and banquet rooms may have uniformly spaced ceiling units of the same size and design. Another method often used to very good advantage where the architectural design of the interior will permit, is that of having one large central ceiling unit and a number of smaller units of the same general type uniformly spaced over the area to be lighted.

Exchange, Lounge and Lobby Require Artistic and Pleasing Effects.

What has been said above regarding decorative lighting fixtures for dining rooms and grills applies even more for exchange or lounge and lobby. Artistic and pleasing effects may be obtained in a number of ways by means of ceiling units, wall brackets, concealed sources such as pedestals or urns, or a combination of these.



PLAN OF TYPICAL HANDBALL COURT LIGHTING
FIG. 2

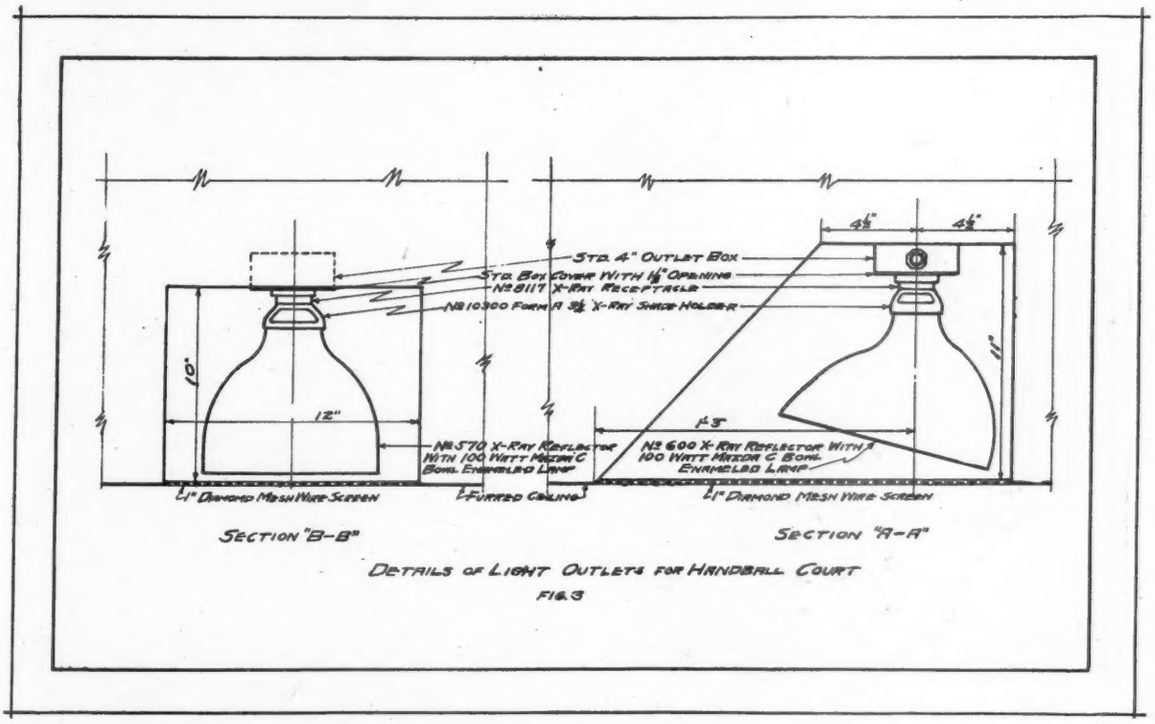
The most satisfactory system of illumination for the card room is that employing general indirect or semi-indirect lighting from ceiling units, giving an intensity of about 4-ft. candles uniformly distributed over the room.

Rest Rooms Require Subdued Light of Appropriate Intensity.

The essential requirement in rest room lighting is that of having a restful, subdued light. Ceiling or side wall units, or a combination of the two are suitable for this room if of the proper type. Floor or table lamps with shades in subdued color tones may also be used to very good advantage for rest room lighting to obtain the desired effect, either alone or supplementary to ceiling or side wall units. Provision should be made in the wiring layout for a sufficient number of baseboard receptacle outlets to accommodate these portable lamps.

There are a number of standard billiard or pool table lighting fixtures on the market which serve the purpose very efficiently for this type of service. An intensity of 5 or more foot-candles is required on the tables with an avoidance of all shadows. One or more ceiling outlets directly over the billiard table, depending upon the fixture used, solves the electric wiring requirements.

Bowling alley lighting requires an even illumination over the entire length of the alley—avoiding light and dark spots—with a relatively high intensity over the pins. A satisfactory method of handling this class of lighting, and one extensively used, is that of providing one row of nine outlets over the center of the alley as shown in Fig. 1. Beginning with the first outlet directly over the foul line, the first eight should be spaced 7 ft. 6 ins. apart, with units mounted 7 ft. 6 ins. above the alley, and ninth one 5 ft. from the end of the alley and 5 ft. above the floor. With lighting units spaced and mounted as above described and equipped with angle type reflectors turned to throw the light toward the pins, thereby avoiding any glare in the eyes of the player, excellent results will be obtained. (Fig. 1.)


4½"
4½"
STD. 4" OUTLET BOX
STD. BOX COVER WITH 1½" OPENING
Nº 8117 X-RAY RECEPTACLE
Nº 10300 FORM A ½ X-RAY SHADE HOLDER
10"
12"
11"
Nº 570 X-RAY REFLECTOR WITH 100 WATT MAZDA C BOWL ENAMELED LAMP
Nº 600 X-RAY REFLECTOR WITH 100 WATT MAZDA C BOWL ENAMELED LAMP
1" DIAMOND MESH WIRE SCREEN
FURRED CEILING
1" DIAMOND MESH WIRE SCREEN
SECTION "B-B"
SECTION "A-A"

DETAILS OF LIGHT OUTLETS FOR HANDBALL COURT

FIG. 3

Gymnasium and Handball Court Require Treatment of Special Character.

The gymnasium proper is usually a fairly good sized room with a high ceiling, and offers no particularly difficult lighting problem. It is primarily a question of the proper spacing of outlets for the mounting height and size of units determined upon to give a uniform illumination of from 3 to 6-ft. candles. The lighting fixtures should be protected by wire guards or baskets inclosing the fixture.

To secure for handball courts adequate illumination of the requisite quality and uniformity, and distributed over the areas in the desired proportions, at the same time arranging the lighting fixtures so as to avoid glare and interference with the ball in play, are the factors entering into the problem of handball court lighting. A solution giving very effective and satisfactory results is obtained by placing the units in recessed openings in the ceiling, and covering these openings at the bottom with wire mesh, flush with the finished surface of ceiling. One row of outlets should be provided parallel with and about 10 ft. from the "board" or playing end of field, with outlets spaced 2 ft. on centers and equipped with angle type reflectors. The balance of the field may be lighted by six units uniformly spaced. A plan of typical handball court lighting is shown in Fig. 2 with details of light outlets shown in Fig. 3. In this manner the light will be where it is needed and from a source out of the line of vision of the player and, quite as essential, there will be no cumbersome fixtures interfering in any way with the game.

Different Arrangements Suitable for Illumination of Bedrooms.

There are four different arrangements usually followed out in bedroom lighting which may be enumerated in the order of their desirability as follows:

First, by one ceiling unit in the center of the room, preferably an indirect fixture, to provide general illumination, and table, desk and bed lamps supplied from conveniently located baseboard outlets. Secondly, by one ceiling unit in the center of the room, and a ceiling outlet with a drop light over the dresser or dressing table, mounted about 6 ins. above the head of the user. This drop light with suitable shade provides local illumination. Thirdly, by paired wall brackets used in conjunction with or without the central ceiling fixture. Fourthly, and most common, is the arrangement using one central ceiling fixture only; this arrangement, however, should be dis-

couraged except where rigid economy is necessary.

The first arrangement provides a pleasing and at the same time a more flexible layout than is obtained by the second or third arrangement, owing to the fact that the drop light or wall brackets, definitely and permanently fixes the location of the dresser, dressing table or article of furniture over which the outlet is located.

When the wiring for any type of building to be used for any purpose, whether residence, hotel, club or factory, is carefully planned and designed to meet the individual requirements, by one experienced in that particular line of work, far better results will be obtained than if left "to be taken care of on the job."

DISCUSS ENTRANCE SAFETY SWITCH AT SALES CONFERENCE.

The Wadsworth Electric Manufacturing Co., Covington, Ky., held a sales conference last month to discuss the promotion of its products and to assist in developing a plan by which the electrical industry could be informed of the use of inclosed switches for the purpose of safety. Comments were made during the meeting on the entrance safety switch for electrical homes to insure the development of good will on the part of the

Delegates in Attendance at Sales Conference of Wadsworth Electric Manufacturing Co.

customer toward the power companies, and to eliminate trouble and expense formerly experienced with fuse renewals.

The industrial field was also discussed and it was the opinion of all the representatives that the inclosed switch idea is more widely appreciated among electrical engineers, and that the use of safety switches of the inclosed type was becoming more widely understood and applied. G. R. Watson, formerly Cincinnati representative of the Crouse-Hinds Co., has assumed the position of general sales manager of the Wadsworth Electric Manufacturing Co., and will promote the application of its line of products to this safety movement. "Compro" switches have been developed with this thought in mind.

In the photograph reproduced on this page are shown the following officials of the company: Bottom row, left to right—W. R. Allen, factory superintendent; G. B. Wadsworth, president; R. J. Dibowski, secretary and treasurer. Top row, left to right—G. R. Watson, general sales manager; W. A. Bittner, district sales manager, Pittsburgh; J. R. Allen, district sales manager, Kansas City, Mo.; Lee Skipwith, district sales manager, New York City; J. H. Stackhouse, district sales manager, Chicago; and G. E. Wadsworth, special field representative.

NEW YORK COMPANIES SECTION, N. E. L. A. TO MEET.

The first meeting of the 1921-22 season of the New York Companies' Section of the National Electric Light Association will be held on Wednesday, Nov. 16, in the auditorium, 130 East 15th street, New York City, with two of the industries' most active men as speakers. John W. Lieb, vice-president, New York Edison Co., will deliver his lecture, "Leonardo da Vinci, Artist, Natural Philosopher and Engineer," and M. H. Aylesworth, executive manager, National Electric Light Association, will talk on the activities and aims of the national organization. T. G. Spates, the recently elected chairman of the section, will preside and will tell of the plans for future local activities.

LYNN SECTION, A. I. E. E., ELECTS OFFICERS.

On Wednesday, Nov. 2, in the auditorium of the Lynn (Mass.) High School, Captain Daniel Mackay gave a lecture on "Riding the Plains with the Royal Canadian Northwest Mounted Police." The address was listened to by several hundred people who were much pleased and instructed by the recital of the captain's experiences.

The new officers of the Lynn Section, American Institute of Electrical Engineers, for the season 1921-22 are F. J. Rudd, chairman, and D. F. Smalley, secretary-treasurer. The next lecture will be by Prof. Franklin of the Massachusetts Institute of Technology.

ELECTRICAL MATERIALS IN GOOD DEMAND IN NEW YORK.

Dealers and jobbers of electrical supplies in New York City report big demands for material entering into housewiring and kindred construction. There is a firm call for such products as conduit and flexible armored conductor, rubber-covered wire, etc. Prices remain practically unchanged, with a tendency for higher levels, and indications of price advances are helping to increase immediate sales. As regards electric lighting fixtures, the bulk of demand is now centered upon those of higher grade and the noticeable increase in sales in recent weeks is due to the completion of numerous apartments and dwellings throughout the Greater City. There is considerable competition among both manufacturers and dealers in the lighting fixture line and as a result prices are unsteady.

The California-Oregon Power Co. has moved its principal office from San Francisco to Medford, Ore. The several hydroelectric power plants of the company are situated in northern California and southern Oregon, and by its numerous transmission lines a large territory is served.

Terminology and Standardization of Illuminating Glassware

Classification of Lighting Glassware in Groups According to Light-Disseminating Qualities and Peculiarities of Individual Types—Results of Light-Producing Tests of Diffusing Globes

By SAMUEL G. HIBBEN
Illuminating Engineer, Westinghouse Lamp Co.

There have been, and will continue to be, certain developments in illuminating glassware that keep pace with the improvements in incandescent lamps and other illuminants, but it has only been within the last few months that concerted efforts have been made to classify, standardize and analyze glass to the extent that indicates the development of a unification in the nomenclature and in its application to the art and science of lighting.

In the first place we cannot intelligently discuss any product unless names and terminology are employed to convey definite ideas of that article to the rank and file of users. In the past it has been customary to speak of glass chiefly by certain trade names, and if one is not acquainted with the fact that superficial coatings, heat treatments or even shapes and sizes of a particular glass will entirely alter its appearance and its properties, then one is left absolutely at sea when trying to get a mental picture of what is the appearance or quality of a piece of Moonstone, Druid, Genco, Florentine, Alba, Crystophane, Alabaster, Muranese or Celestialite glass.

TABLE I.

A CRYSTAL.	B OPALESCENT.	C HOMOGENEOUS DIFFUSING.
Window	Straw	Monax
Plate	Cathedral	Radiant
C. R. I.	Antique	Genco
C. R. O.	Art.	Sudan
Clear crystal	Equalite.	Calcite
Colored crystal	Alabaster.	Nitrolite
Holophane	Ivre.	Nitroglas
Prism	Veluria	Opalux
	Iridile	Blanco
		Una
		Nova
		Ionian
		Thebian
		Decora
		Nemalite
		Nebulite

D FLOCCULENT OR FOAM.	E CASED OR COATED.	F OPAQUE OR SILVERED.
Druid	Cora	All the mirrored glasses.
Alba	Melilite	
Lucida	Selenite	
Moonstone	Mirabilite	
Luna	Camia	
Parian	Gletieco	
Nubolux	Mefco	
Superba	Emeralite	
Luxal	Translux	
Velva	Celestialite	
Marbo	Polycased	
	Cameo	
	Delica	

The average person knows glass in only two terms, "clear" and "diffusing." The glass and luminaire (lighting fixture) manufacturers, the illuminating engineers—in fact all experts—are really not much more explicit, for heretofore a certain glass was either "crystal" if of the general consistency of window glass, or "opal" if white and translucent. It is conceivable that the art of better lighting can advance only as the knowledge of it gains ground in our everyday lives, so, in discussing a lighting accessory like glassware we should all speak a similar language—should all understand each other. With this idea in mind it has been proposed to first classify all lighting glassware in six groups, and if we then assemble a number of trade glasses and endeavor to give to each group a general descriptive name, we evolve a table such as the accompanying Table I.

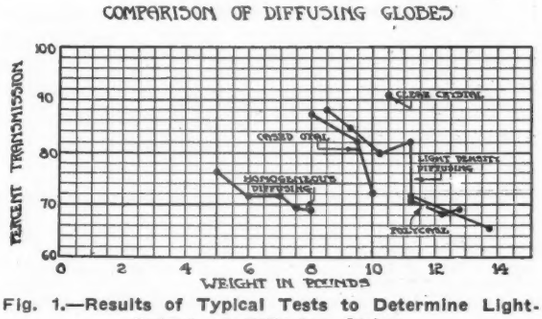


Fig. 1.—Results of Typical Tests to Determine Light-Output of Diffusing Globes.

Analysis of Standard Terms Under the Proposed Group Plan.

Group C might be termed "uni-layer diffusing," and Group E, "multi-layer diffusing." Group D has often been styled "milk-glass," but this loose term has also included groups C and E. If in this or a similar manner we can identify a glass specimen in a general class then we are ready to subdivide each group according to the physical properties of each member of the group; i. e., as to the degree of light-transmission or absorption or diffusion of any particular specimen. This subdivision will naturally begin with the classification of a glass as "light density," "medium density" and "heavy density."

Heretofore there has been no line of demarkation between glassware of various densities. What would be light density of one manufacturer would be medium density of another, and no range in figures has been agreed upon to allow of proper or even tentative classification. Suppose, for a step toward standardization, we select a 12-in. spherical ball globe of any particular glass and place at its center a standard light source, such as a 150-watt ring-type Mazda C lamp. Then, hav-

ing the top closed with white blotting paper, and under certain uniform specifications, let us measure the total light output of that particular globe, thus arriving directly at a numerical figure of output efficiency. By making this measurement

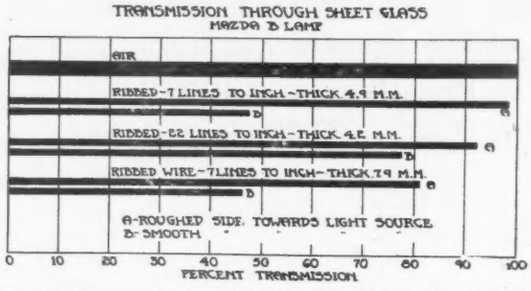

TRANSMISSION THROUGH SHEET GLASS
MAZDA B LAMP
AIR
RIBBED-7 LINES TO INCH-THICK 4.9 M.M.
RIBBED-22 LINES TO INCH-THICK 4.2 M.M.
RIBBED WIRE-7 LINES TO INCH-THICK 7.9 M.M.
A-ROUGHED SIDE TOWARDS LIGHT SOURCE
B-SMOOTH
0 10 20 30 40 50 60 70 80 90 100
PERCENT TRANSMISSION

Fig. 2.—Transmission of Light Through Crystal Glass Depends Greatly Upon Surface Configurations.

with, say, three samples of the same glass, taking the upper, lower and intermediate weights (thicknesses) of glass, we can get an average figure of absorption loss that will be comparable with other similar shaped ball globes of different glass composition. This data will enable the grouping of "blown" glassware, either paste or iron-mold, according to its optical density, and once we have agreed upon the range in figures for each density we can at once allocate any glass specimen. As a suggested range the accompanying Table 2 is presented.

TABLE II.

Optical density.	Percentage of light output.
Light density glass	87% to 100%
Medium density glass	75% to 87%
Heavy density glass	Below 75%

The same procedure could be followed in comparing press-mold glasses starting, say, with a uniform diameter of hemisphere in which the light center is placed at a definite point, and the top covered light-tight with a sheet of material having a constant coefficient of diffuse reflection.

Character of Diffusion Should Be Known for Purposes of Grouping.

One other characteristic should be known before glassware can be properly grouped. That is the character of diffusion, and without this knowledge the "density" means very little. Clear crystal glass may be considered in the "light density" class but its diffusion would rank as zero. Hence, we need a third table of classification and for all practical purposes this table can be based upon the ratio of the candlepower brightness of a square inch of visible globe when observed at the limb or edge of the illuminated specimen (the darkest square inch) compared to the brightest square inch which is usually at the center of the globe.

For such tests it is feasible to use the same 12-in. ball globes mentioned above and the same light source, and to rotate the sample combination during these brightness measurements. Practically, the operation is to place before and close to the globe an opaque screen having in it a small opening of known dimension, and to measure foot-candles with a photometer placed at, say, 2 ft. directly in front of this screen opening. Then, by multiplying this foot-candle reading by the square of the distance (4) we arrive at the candlepower of that visible portion of the globe seen through the opening. If the screen and the photometer be moved across the diameter of the globe it is easy to read the brightness of successive spots and plot a curve of "diffusion," with globe diameter dimensions as abscissae and globe brightness as ordinates.

Ideal diffusion would result in a flat horizontal line; i. e., a square inch at the limb of the globe would be as bright as a square inch at its center. With a poor diffuser, like a C.R.I. globe, the center square inch would be perhaps a hundred times as bright as a square inch at the edge. In this way we can fix a ratio of edge-brightness to center-brightness, that will at once enable us to put any glass into a table of good, medium or poor diffusers.

It will be seen that through this process of classification we can rate any glass, (1) into a group with a general descriptive name; (2) into a division of that group according to density rating, and (3) into a subdivision of the division, according to diffusion rating.

Fig. 1 illustrates the results of typical tests of light output of inclosing diffusion globes. In the case of the "homogeneous diffusing globe," for instance, it is seen that the 5-lb. sample had an output of 76%, while the 8-lb. sample of the same glass had about 68%. An average globe weight for this specimen might fairly be taken as 6.5 lbs., and with a light output of 72% we would, according to Table 2, classifying that glass as "Heavy Density." The curve designated as "Light Density Diffusing" shows that this particular glass, if it is to be so rated, must be blown in about a 9-lb. globe. If sold in the 12-lb. weight it would be rated "Heavy Density."

Classifying sheet glass is more difficult. Transmission loss of light includes both absorption loss in the body of the glass, plus backward reflected light from the surfaces of the glass. For this latter reason the surface configurations have a tremendous influence on transmission, as Fig. 2 indicates. Much depends, too, on whether the

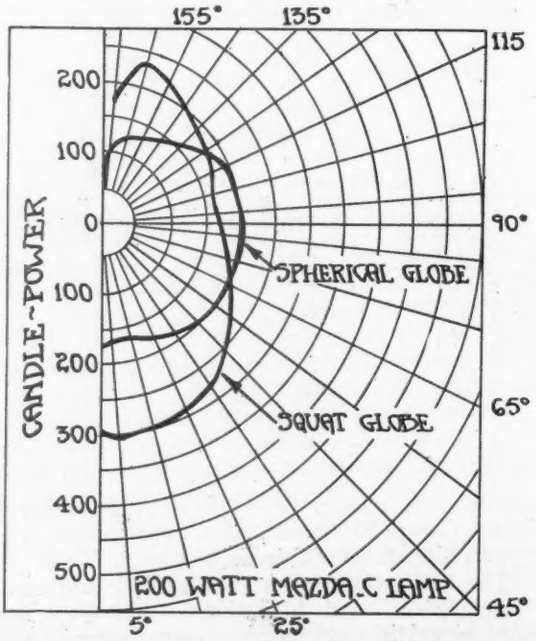


Fig. 3.—Shape of Globe Has Much to Do With Light Output.

incident light is diffused as from an overcast sky or is from a single source, like the sun or a Mazda lamp. Test specifications and methods for classifying sheet glass are now being worked out.

More Attention to Science Needed in Production of Glassware.

One of the ills of illuminating glassware has been too much art and too little science. Making glassware efficient or non-glaring need not in the slightest destroy its artistic value. A large and handsome Gothic church luminaire is just as handsome and serviceable if its panels or cylindrical lanterns be of softly diffusing glass instead of crystal roughed glass, and most assuredly the headaches in the congregation will be fewer.

TABLE III.

Fitter size in inches.	Basic minimum clearance in inches.	Lamp wattage and maximum diameter in inches.
3.25	2.750	60 watts* 2.625
4.00	3.250	150 watts 3.125
5.00	4.125	200 watts 3.750
6.00	5.125	500 watts 5.000
8.00	7.125	1000 watts 6.500

*The 75-watt lamp, 2.75 ins. diam., will clear if all blown fitters be gaged in accordance with standardization service.

For show windows, store entrances and small offices a diffusing globe of a "squat" shape is no less artistic than one of a long stalactite shape, but with the former there will usually be twice as much downward light as with the latter. Fig. 3 illustrates this difference. Each shape has its particular place and service and emphatically should not be used indiscriminately.

If as much engineering talent had been expended upon commercial glassware as upon metal reflectors the position of the glass manufacturer in the industrial lighting field would be a great deal stronger than it is today. These needs of glassware development are realized by the Glassware Guild and the indications are that the progress in the next few years will be great and gratifying.

It will be a step forward if luminaire and glassware manufacturers will eliminate the multiplicity of fitter sizes and shapes, working to a few standard sizes, such as 2.25, 3.25, 4, 6 and 8 ins. The largest size of standard Mazda lamp passing these fitters (on blown articles) are as indicated in the accompanying Table 3.

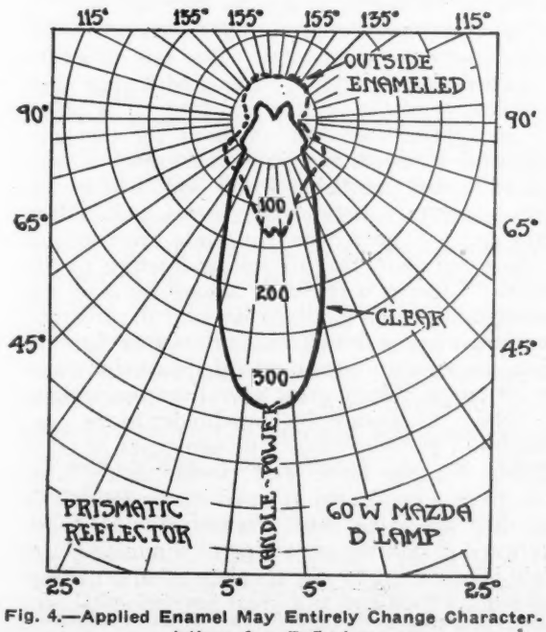


Fig. 4.—Applied Enamel May Entirely Change Characteristics of a Reflector.

But, even though a lamp may pass into a globe, nevertheless it may not always be good practice to use that lamp therein because of the uncomfortable brilliancy of the unit. From the viewpoint of comfort, where a medium or light-density diffusing glass globe be used within the field of view, it has been proposed to establish for each size of electric lamp a minimum diameter of globe. Whether this is feasible, and whether the variations in glassware shapes be too great to allow of this standardization, remains for the next year's work to prove. True it is that the uncurbed use of very small shielding or inclosing globes around brighter and brighter light sources does prostrate the lighting art, leading to the sale of no glass at all rather than to more of it. A proposed table of the minimum globe sizes allowable for various lamps is as follows:

TABLE IV.

Size of lamps in watts.	Lumens.	Globe diameter in ins.	Equivalent visible area in sq. ins.
50	750	6	28
75	880	8	50
100	1,300	10	79
150	2,100	12	113
200	3,100	14	154
300	4,900	16	201
500	8,800	18	254
750	14,000	18	254
1,000	20,000	20	314

The 6-in. globe, if on wall brackets, would be uncomfortably bright if used in light density glass and with a lamp as large as indicated in Table 4. The 500, 750 and 1000-watt combinations in 18 and 20-in. globes will be the brightest of the group, but such units are usually hung sufficiently high to minimize the glare objections.

Other Developments of Interest to the Illuminating Industry.

Certain other interesting developments deserve mention in connection with recent illuminating glassware progress, notably the extremely handsome superficial coatings, glazes and colorings applied to crystal etched and diffusing pieces, and the development of 1-piece or closed-top, semi-indirect bowls. The use of a good sprayed or burnt-on coating over a crystal glass base can make of that combination an excellent reflector. Care is urged, however, for a diffusing treatment, if applied to such an article as a clear prismatic reflector, may utterly change its characteristics, as Fig. 4 indicates.

Misconceptions about ventilation and needs of drilling inclosing globes are being met by better knowledge from tests and reputable experiences.

No general comments can be made in this short discussion covering the excellent efforts of the Glassware Guild and the National Council of Lighting Fixture Manufacturers to improve illuminating glassware quality and application. It is gratifying to note progress towards standardization and it is hoped that terminology, classification and methods of testing such as outlined above, be adopted, not neglecting the prime requisites of standardized fitter dimensions and of careful engineering study of glass densities and shapes.

ARTISTIC VALUE OF ILLUMINATING GLASSWARE.

Peculiar Qualities of Glass Described in Paper Presented Before Illuminating Glassware Guild Convention.

By M. Luckiesh,
Nela Research Laboratories, Cleveland, O.

It was not until after the revolutionary war that a piece of glassware was placed on a light source with scientific intent. It was in 1784 that Argand placed a glass chimney over his oil burner to increase the supply of air and thereby to obtain better combustion. The chimney also protected the flame from drafts which made it flicker. At the beginning of the last century materials were still being burned in the production of light, and this continued until the introduction of the electric filament lamp. The cost of light in 1900 was reduced to about 1% of the cost of light obtained from candles in 1800. Since 1900 the progress in various ways has been such as to make the present an opportune time for the introduction of artistic glassware in lighting. Light is obtained now much more efficiently than it ever was before. The cost is much less than in the past century. The best principles in lighting demand that our modern bright light-sources be shaded and that the light be diffused. The user of light, such as the householder and others, has awakened to the possibilities of light in the home.

Those interested in the best lighting principles can not commend the use of bare or frosted lamps, unshaded in many cases; however, in order that glassware shall take its proper place in lighting fixtures it must be made more artistic. White glass is not pleasing in appearance in the home where decoration and furnishings are given much attention. It must be toned and decorated artistically in order that it may harmonize with other elements of decoration. Crystal glass which does not shield our modern light sources or diffuse the light sufficiently can not produce the best results. Sandblasted or etched crystal glass is not sufficiently diffusing in many cases to be satisfactory. The householder is willing to purchase things that beautify the home and make a house into a home. Evidence of this is seen in any of our homes; for example, the householder will pay ten times as much for a dining-room table as is necessary to satisfy purely utilitarian needs. We do not think of efficiency in many of the phases of house furnishing and decoration—we want comfort and artistic results; therefore, we should not talk about efficiency in its narrow sense when dealing with artistic lighting. We should expand the term efficiency to include satisfactoriness.

There is still a tendency in fixture design to modernize the classic fixtures of the age of candles by substituting our present-day light-sources for candles, but our modern light sources being so much brighter than the sources of a half century ago our modern fixtures are found very often to be glaring, and where we have glare-discomfort a lighting fixture when lighted can not be artistic in the broad sense. The principles of good lighting in the home and in similar fields are fairly well established although they cannot be standardized to the extent that the purely utilitarian aspects can be. However, when we establish a correct lighting principle we should retain that principle in new fixtures; for example, some years ago the dome was popular as a dining-room fixture. When it was properly designed and installed it produced very satisfactory lighting for this purpose because it lighted the dining table predominantly. Many of these domes were hideous from an artistic standpoint and eventually other fixtures were developed, but these fixtures did not retain the good principles of lighting embodied in the dome. For example, the semi-indirect unit sent the light upward instead of downward. It is possible to retain the correct lighting principle and still produce fixtures differing in appearance from those which preceded them.

Fixtures Should Be More Than Simply Sockets for Lamps.

One of the chief criticisms that we can apply to lighting fixtures today is that generally they merely provide sockets for lamps instead of being designed to produce a certain lighting effect which is a combination of distribution, diffusion and tint of light. The portable lamp is becoming more and more popular in residence lighting and, considering its possibilities from both the utilitarian and artistic standpoints, it has a right to become more and more popular. Illuminating glassware, if it is to be used in portable lamps, must compete artistically with other materials so much in use today. This is also true in the case of brackets and other fixtures where parchment, silk, and other textiles are popular media for shades. It has been proved by some of the leaders in the manufacture of artistic glassware that glassware can compete with other materials which are more or less popular today. Certainly, glass in the long run is cheaper than silk for shades. Glassware lasts longer; that is, it is more durable than some of the other media. Possessing this advantage, it is only necessary to make glassware artistic enough to compete in order for it to take the place it is entitled to in artistic lighting.

That glassware is susceptible to artistic treatment is seen in many ways. This is testified to by stained-glass windows, vases, and a great deal of tableware of the present and past. The progress in lighting has been rapid in the past decade, and it is gaining in momentum. Today modern homes are being wired with five to ten times as many outlets as the homes built a few years ago. A great many interests are working to the same ends, that of selling lighting to the public. There is a tendency among some of the leading fixture designers to develop fixtures for specific purposes, fixtures which produce lighting effects rather than merely provide places for sockets for lamps. Many great advertising campaigns are helping to educate the householder to the possibilities of good lighting. The principles of good lighting for the home and similar fields have been given a great deal of attention by specialists and they are fairly well established. All those interested in lighting are trying to eliminate glare. Light is beginning to take its place as an ornament and a decoration and as a great psychological factor in our homes.

EDITORIAL COMMENT

Selling Fixtures

Selling lighting fixtures is just like selling anything else. That is, every deal is just a little different from every other one, but the giving of service in advance of the placing of the order is an element that always plays a vital part in the transaction. A story appearing in *Beardslee Talks* tells how one small contractor-dealer placed himself in a position to take an order for fixtures in competition with more prominent rivals. The story follows:

"During a recent stay at one of the medium sized hotels in one of our larger cities I wandered into a newly opened cafeteria and soda fountain. I ordered a chocolate soda and upon offering to pay for it was informed by the hotel manager that 'the drinks were on the house' and that the cafeteria and soda fountain would be open for business the following day. The most natural thing to do was to thank the manager and to compliment him on the appearance of the new addition, and being electrically inclined I viewed with pleasure the new lighting equipment.

"We talked for some time about the new addition which this hotel was just completing and about lights and lighting equipment within our modern hotels. The manager told me of the delay in receiving the furniture for the new rooms, and that the local furniture dealer had loaned him temporary furnishings until the special-built equipment arrived, and then added that the furniture dealer was not the only man who gave him some real service. I asked him if he bought his lighting equipment from a certain well-known dealer in his town and was much surprised to have him tell me that it was purchased from a small dealer of whom I had never heard.

"After he had finished, the reasons for giving the small dealer the order were obvious and in substance they were as follows: Whenever a hotel builds an addition, which necessitates some changes in the old structure, the services of an electrical dealer are almost constantly in demand. Wiring circuits must be changed and temporary lights installed and, because of the shortage of rooms, as new rooms are made available in the addition they must be equipped with some sort of lighting so that some revenue may be derived from them.

"The small dealer on this particular job was always on hand when wanted. He moved old circuits, put in temporary circuits and installed temporary lights whenever they were needed. While the construction work was going on he visited a chandelier manufacturer, secured sketches, samples, prices, etc., and showed these to the hotel manager. Hence, long before the addition was completed he had secured the selection of every lighting fixture needed and had so thoroughly intrenched himself in the heart of the hotel manager that when it came time to place the contract for all the lighting equipment required for the new addition and in the old structure the entire order was readily given to him, even though several well-known and reliable dealers submitted sketches and prices. The other dealers did not avail themselves of the opportunity to win that personal friendship and confidence which the small dealer had secured while the new construction and alterations were being made."

Co-operation in the Electrical Industry

The Illuminating Glassware Guild is fully alive to the importance of co-operation and is reaching out to make contact wherever possible with the various other branches of the industry. That the Guild appreciates co-operation is shown by the following comments appearing in a report of the merchandising committee of the Guild:

"It has been gratifying to your committee to note that the manufacturers of the mazda lamps are very much interested in the question of having their lamps used properly in the commercial and home lighting field. It seems to be the policy of the lamp manufacturers to recommend the use of the type C lamps to a greater extent than formerly in the home lighting field and to recommend these lamps in practically all cases in the commercial lighting field.

"Where the type C lamp is to be used it is necessary that the lamp filament be properly shielded on account of the great intensity of the light source. The lamp companies, wherever they are recommending the use of the type C lamp for commercial or home lighting work, are recommending suitable shades or lighting units for use with the lamp, and I believe it is true to state that in the majority of cases they are recommending glass units.

"As far as your committee has been able to gather it is the practice, even in the smaller types of lamps like the type B lamp, for the lamp companies to recommend that their lamps be used with some kind of a shade or globe. In most of the publications issued by the lamp companies

and in the articles that they write reference is made to the proper use of their lamps and the need of shading or shielding the light. In this connection an article appeared in the *Sunday News-Leader* in the magazine section, which was an interview with Dr. Luckiesh of Nela Park. In this interview the type of unit described for the dining room embodies altogether the use of lighting glassware, and throughout the article Dr. Luckiesh has pointed out the ill effects of glaring unshielded light and the desirability of eliminating glare in the home.

"As the necessity for shielding or shading the light becomes more generally recognized it cannot help but react favorably on the lighting glassware business, if we glass manufacturers do our part towards producing glass shades that are attractive in appearance and accomplish the desired results."

At another point the report says: "A review was made of the articles that had already appeared bearing on the subject of the use of illuminating glassware. The following articles have appeared in the lighting issues of ELECTRICAL REVIEW: An article by F. J. Blaschke of the Ivanhoe-Regent Works appeared in July; an article by E. Y. Davidson of the Macbeth-Evans Glass Co. appeared in August, and an article by H. T. Spaulding of the National Lamp Works appeared in September." The report goes on to enumerate other articles planned for the future, one of which is the story by S. G. Hibben appearing on other pages of this issue of ELECTRICAL REVIEW. Attention is also called to articles on "Lighting Glassware" and the need for "Shielding Light" in the *National Stimulator,* the house organ of the National Lamp Works. One article along similar lines has appeared in the *Edison Sales Builder,* the house organ of the Edison Lamp Works.

Industrial Illumination

In order to secure the full benefit possible from a modern system of illumination the manager of a factory or other industrial plant must bear in mind the ability of the operator to get a clear vision of all parts of his or her work during the entire number of hours in the day that artificial light is used. This means that the diffusion, direction, intensity and color of light should be such that the worker can carry on the operation for prolonged periods with the least possible eyestrain so that the output and quality of the work will not suffer as a result of improper illumination. As lighting cost is a very small fraction of the total expense for labor and material in manufacturing of any class it follows that ultimate economy must result from liberal use of light, even if the lighting cost is largely increased.

As has frequently been brought out in ELECTRICAL REVIEW, there is no ultimate economy in using very bright lighting sources suspended within the ordinary field of vision of those working in the illuminated area, even though the actual intensity of illumination on the work may be considerably greater than it would be if the lamps were inclosed in diffusing reflectors which soften the light. The price of good diffusion may be, say, 25% of the direct effect of the total light generated, but the usefulness of the light for actual purposes of vision is greater than it would be in the glare of brilliant lighting units.

Again, the amount of light that reaches the objects to be illuminated may be in itself of less importance than the direction from which the light comes. The factory manager usually gives most careful attention to the placing of his machines, work benches, tables, etc., with reference to the best direction of daylight on the work, but often fails to give equal attention to the best direction of artificial light on the same work. Thus, it frequently happens that the systematic scheme adopted for daylight conditions is largely nullified in artificial lighting. While it is true that in the present state of the art it rarely happens that the same directive effects by artificial light are obtained as in daylight, a fairly close approach to the daylight conditions can often be made without undue expenditure.

"Technical" efficiency of a lighting installation, that is to say, the ratio of the light delivered on the objects to the total light generated by the lamps is not to be taken as a measure of the visual efficiency of the light. It follows from what has already been stated that of two lighting installations the technical efficiency of one of which is double that of the other, ultimate economy may result from the use of the installation having the lower technical efficiency. The true criterion always is the ability to see well, and the percentage of light delivered on the work is only one factor and often a secondary one in comparing the real illumination value of lighting installations.

For the most part artificial lights having a color approximating as closely as possible to that of average daylight are safest for general use. However, there are numerous cases in practice in which artificial lights having a distinctive color value can be used to great advantage. Thus, for example, in foundries, cement mills and other establishments in which the atmosphere is likely to be filled with smoke or dust it is advantageous to use a light whose rays are very penetrative. Again, in many cases in industrial work a monochromatic light is very advantageous because of the color contrasts which it produces. Though objectionable where true color discriminations are

required such light assists in quick and close discernment in some classes of work, and for some purposes may be even more efficacious than daylight.

Not only the color of light, but the color of the ceilings and walls of the room has an important bearing on the ultimate economy of lighting. It is now, of course, a well-recognized fact that light-colored ceilings and walls reflect a larger percentage of light than do darker colors and add greatly to the general illumination of the room. Mat surfaces are always better than glossy or shiny surfaces because the latter cause reflections of light which decrease the visual sensibility. Hence, when walls are painted a dead finish gives the best results. On account of the annoying reflections from machinery it is often desirable to paint or otherwise dead-finish such parts as practicable in a neutral tint. It is, however, possible to use reflectors so constructed as to cut off all direct light from the lamp and eliminate glaring reflections from bright surfaces.

The cost of the lighting equipment and the cost of maintenance must of course be taken into account in considering the ultimate economy of lighting. Both of these factors usually receive most careful attention on the part of the manager of the industrial plant, but, curiously enough, the important collateral question of loss of light due to accumulation of dust and dirt on lamps, globes, shades and reflectors is often overlooked or underestimated. It is no uncommon thing in industrial lighting to find this loss as high as 40 to 50% which, taken in the aggregate, means millions of dollars a year wasted annually.

Any system of lighting which requires more or less frequent handling of indivdual lamps by the worker to adjust the location of the light with reference to the work is likely to be costly in operation in that it consumes the time of the worker and distracts his or her attention. There are many industrial establishments in which the operators adjust the height and angle of the lamps to suit their individual tastes. Each operator adjusts the position of his lamp close enough to his work to give an illumination which is satisfactory to him. As a result of this practice it sometimes happens that the operative, in order to secure suitable illumination on this work, may so adjust the lamps that part or all of the light from it shines directly into the eyes of the neighboring worker, thus impairing the efficiency of the latter. The general plan of permitting each individual operative to act as an independent "illuminating engineer" is on its face open to severe criticism, though it is difficult to convince some industrial plant managers of the need of changing.

Where localized lighting is properly employed it is to supplement general illumination of low intensity for machine, bench or table work where high-intensity lighting is called for over a restricted space or the light needs to be directed horizontally. Small lamps with suitable angle reflectors are ordinarily used for this purpose. It usually pays well, however, to provide efficient general illumination throughout the workroom to prevent or minimize accidents. The insurance companies' records show in a most convincing way that the greatest number of accidents in industrial plants occur during the months of diminished daylight. With artificial light, where the difficulties in securing good diffusion are so much greater than they are by daylight, the consideration of ample lighting as a means of preventing accidents to the worker should have great weight.

Are You Going?

Are you going to attend the big convention in Milwaukee Jan. 30-Feb. 4, 1922? There is no good reason why you should not attend, and there is one mighty good reason why you should. That reason is business. Milwaukee is busy right now and has been working ever since the Fixture Market a year ago to make this week—Jan. 30-Feb. 4, 1922—the greatest week the lighting industry has ever known. Much good will come out of this convention, but the men who attend will be the ones to receive the full measure of benefit from personal contact with the leaders of the industry —the men who see things in a big way and have the power to stand on their feet and tell in forceful words about the things that are being accomplished all over the United States.

The man who goes to Milwaukee cannot help but absorb enthusiasm and ideas that will go a long way toward making him make his business what he wants it to be. Conventions are sometimes said to be wasteful of time and money, but conventions of the lighting fixture people have never been in this class and Milwaukee intends to make the coming meeting a most beneficial and profitable one. The following item taken from the news bulletin of the National Council of Lighting Fixture Manufacturers shows what is being done on one detail for the great convention week:

"The 'Better Lighting' committee, of which F. A. Coffin is chairman, is giving very convincing evidence of the work which they are carrying out, and the fine spirit of co-operation with which every electrical interest in the city is getting behind this move. Up to the present date they have raised no less than $20,000 to help to put this campaign across. This committee is getting a flying start, and we know that with the energetic leadership of Mr. Coffin this 'Better Lighting' campaign is going to be the most successful demonstration of its kind ever staged."

THE WEEK'S NEWS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

ROCKY MOUNTAIN PUBLIC UTILITY COMMITTEE FORMED.

Committee to Supply Public With Accurate Information in Regard to Utility Business—Membership and Officers of Committee.

Permanent organization of the Rocky Mountain Committee on Public Utility Information has been completed. The committee whose field will cover the states of Wyoming, Colorado and New Mexico was organized under the joint auspices of the Rocky Mountain Division of the National Electric Light Association, the Wyoming Utilities Association, the Colorado Electric Light, Power and Railway Association and the New Mexico Utilities Association. The presidents of these four organizations are to be ex-officio members of the committee.

The full membership of the committee and its officers are as follows: T. O. Kennedy, chairman of the committee, Denver Gas & Electric Light Co., Denver, Colo.; V. L. Board, secretary and treasurer of the committee, Denver Gas & Electric Light Co., Denver, Colo.; Frank Kivel, Denver Gas & Electric Light Co., Denver, Colo.; Norman Read, The Colorado Power Co., Symes building, Denver, Colo.; W. C. Sterne, Summit County Power Co., Gas & Electric building, Denver, Colo.; Walter F. Brown, Mountain States Telephone & Telegraph Co., Denver, Colo.; John J. Cooper, Mountain Electric Co., 1623 Glenarm, Denver, Colo.; John F. Greenawalt, Mountain States Telephone & Telegraph Co., Denver, Colo.; E. A. West, Denver Tramway Co., Tramway building, Denver, Colo.; E. A. Phinney, Jefferson County Power & Light Co., Golden, Colo.; Fred Norcross, Home Gas & Electric Co., Greeley, Colo.; Frank J. Dostal, Colorado Springs Light, Heat & Power Co., Colorado Springs, Colo.; Chas. A. Semrad, Western Light & Power Co., Boulder, Colo.; W. F. Raber, Arkansas Valley Railway, Light & Power Co., Pueblo, Colo.; E. P. Bacon, Natrona Power Co., Casper, Wyo.; Arthur Prager, Albuquerque Gas & Electric Co., Albuquerque, N. M.; H. D. Randall, General Electric Co., Denver, Colo.; L. M. Cargo, Westinghouse Electric & Manufacturing Co., Denver, Colo.; A. C. Cornell, Western Electric Co., Denver, Colo.; D. P. Strickland, Colorado Springs & Interurban Railway Co., Colorado Springs, Colo.; J. A. Clay, Western Colorado Power Co., Durango, Colo.; W. P. Southard, Trinidad Electric Transmission Railway & Gas Co., Trinidad, Colo.; E. J. Condon, Jr., Intermountain Railway, Light & Power Co., Colorado Springs, Colo.; A. E. Bent, Tucumcari Light & Power Co., Tucumcari, N. M., Colorado building, Denver, Colo.; C. M. Einhart, Roswell Gas & Electric Co., Roswell, N. M.; J. H. MacMillan, Santa Fe Water & Light Co., Santa Fe, N. M.; E. A. Bradner, Las Vegas Light & Power Co., Las Vegas, N. M.; F. H. Roberts, Popo Agie Light & Power Co., Riverton, Wyo., 1900 Hudson, Denver, Colo.; J. J. Withrow, Sheridan County Electric Co., Sheridan, Wyo., and R. B. Beddow, Intermountain Railway, Light & Power Co., Laramie, Wyo.

This committee follows the formation of similar committees in the states of Illinois, Indiana, Ohio, Kentucky, Missouri, Arkansas, Nebraska and Oklahoma and has the same object as these committees, viz., to supply the public with accurate information in regard to public utility business. Information in regard to the electric, light, gas, street railway and telephone business will be covered by the committee. Communications should be addressed, Rocky Mountain Committee on Public Utility Information, 342 Gas & Electric building, Denver, Colo.

PUBLIC RELATIONS DISCUSSED AT SEATTLE MEETING.

Northwest Electric Light and Power Association Outlines Policy to Be Pursued by Organization's Contact With the People.

The executive committee of the Public Relations Section of the Northwest Electric Light and Power Association held a meeting in Seattle, Wash., recently, the following members or representatives being present: R. M. Boykin, North Coast Power Co., Portland, Ore.; W. E. Coman, The Washington Water Power Co., Spokane, Wash.; W. H. McGrath, chairman, Puget Sound Power & Light Co., Seattle; J. M. Kincaid, Washington Coast Utilities, Port Townsend, Wash.; A. C. McMicken, representing O. B. Coldwell, Portland (Ore.) Railway, Light & Power Co., and Geo. L. Myers, Pacific Power & Light Co., Portland.

The principal purpose of the meeting was to effect an organization to determine upon practices and policies in matters of public relations for the present association year. The committee determined that the Public Relations Section shall function in its work through the state organization, each state acting as a unit, with the exception that the executive committee of the Public Relations Section shall co-ordinate the work of state organizations to see that no general policies of concern to the electric light and power industry within the territory of the association are adopted that might be in conflict, and that no policies of such nature shall be adopted by the

Milwaukee is planning a great week of activity for the entire Lighting Industry —The dates are from January 30 to February 4, 1922—ARE YOU GOING?

committee on public relations for any state, or by any subcommittee of the Public Relations Section in any state until first approved by the executive committee of the Public Relations Section.

The committee determined that all of the present subcommittees for each state, appointed by the chairman of the executive committee of the Public Relations Section, shall be superseded by subcommittees appointed by the vice-president for each state, among which subcommittees there will be the following: (1) Committee on Legislation, (2) Committee on Organization and Education of Employes, (3) Committee on Publicity and Education, and (4) Committee on the Sale of Securities and Relations With Investment Bankers.

The committee directed the vice-president for each state to initiate, in co-operation with all other classes of utilities subject to public regulation, the organization of a "Committee on Public Utility Information" for each state, and to have a director, the object of such committee to be to promote and bring about an understanding on the part of the people of the problems of public service enterprise through the press, schools, colleges, civic and commercial organizations and other mediums of publicity and education.

The committee confirmed appointments made by the chairman of representatives on the part of the Northwest Geographic Division (Northwest Electric Light and Power Association) on the Public Relations Section of the National Electric Light Association as follows: Committee on Employes' Relations With the Public, O. B. Coldwell, Portland (Ore.) Railway, Light & Power Co.; Committee on State Organization of Public Utility Information Committees, W. E. Coman, The Washington Water Power Co., Spokane; Committee on Public Speaking, Geo. L. Myers, Pacific Power & Light Co., Portland; Committee on Relations with Bankers, W. H. McGrath, Puget Sound Power & Light Co., Seattle, and Committee on Uniformity of State Regulatory Laws, John A. Laing, Pacific Power & Light Co., Portland.

It is proposed to call a meeting of the Committee on Public Relations for Oregon at an early date, at which time the proposed program of the executive committee of the Public Relations Section will be given thorough consideration with the hope that all, or substantially all, of what is proposed may be put into practice.

Progress reports were made by the chairman of each of the executive committees of the Accounting, Commercial, Public Relations and Technical Sections. The Technical Section in co-operation with the Commercial Section reported that final report covering recommendations as to practices and policies to govern in the making of extensions for electrical service would be ready for submission shortly.

President Putman's appointment of members of the following committees were confirmed: The executive committee of the Accounting, Commercial, Public Relations and Technical Sections, and the committees on Public Relations for Idaho and Oregon, and the Labor and Labor Statistics Committee, Membership Committee and Program Committee.

Lewis A. McArthur, general manager, Pacific Power & Light Co., was appointed as the representative of the Northwest Geographic Division on the Committee on Rural Lines of the National Electric Light Association, and the committee approved of providing for representation on this committee from each of the states of the association. R. R. Easter, of the North Coast Power Co., Hillsboro, Ore., and J. F. Farquhar, of The Washington Water Power Co., Spokane, were appointed representatives for the states of Oregon and Washington, respectively, the president later to appoint the representatives for Idaho, Montana and Utah.

H. H. Schoolfield, chief engineer, Pacific Power & Light Co., Portland, Ore., was appointed representative of the Northwest Geographic Division on the Accident Prevention Committee of the National Electric Light Association. The committee provided for a finance committee of three members, of which the president should be ex-officio a member, and chairman, the other two members to be from the membership of the executive committee, which finance committee will approve expenditures other than those for ordinary expense for conducting the business of the association.

MILWAUKEE COMMITTEES WORKING OUT CONVENTION PLANS.

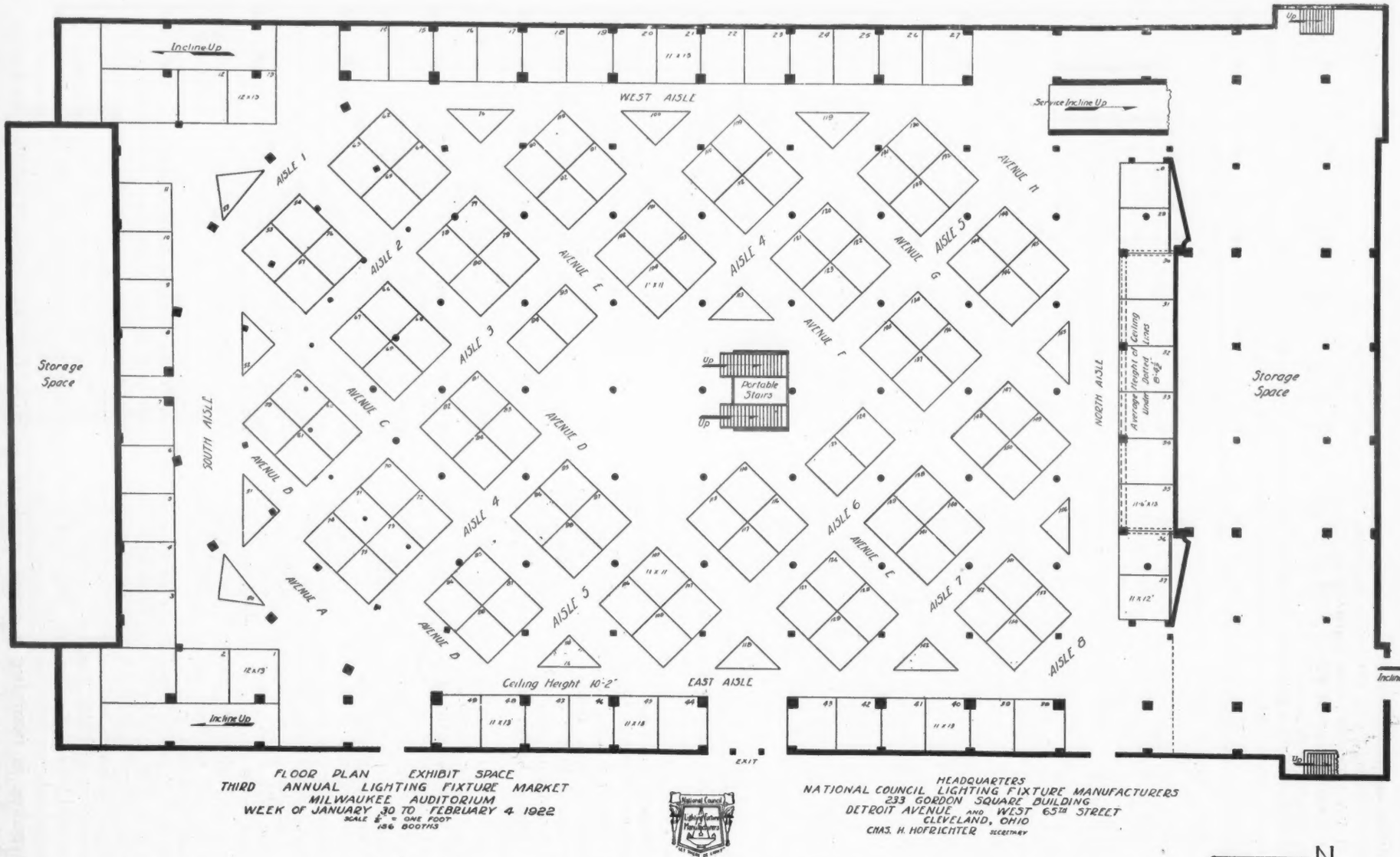
National Council Lighting Fixture Manufacturers Reports Booth Space Being Rapidly Reserved for Fixture Market.

Late advices from the Cleveland headquarters of the National Council Lighting Fixture Manufacturers are to the effect that more than half the Fixture Market booth space in the Milwaukee Auditorium is already reserved for the big event, Jan. 30-Feb. 4. The rapidity with which space is being taken is the surest indication of the confidence of the fixture trade in the prosperous times ahead, and of the value of the Lighting Fixture Market as a splendid method of translating that prosperity into orders and good will. From the dealer's standpoint the Milwaukee Fixture Market promises to be the most important which has yet been held.

Milwaukee dealers are doing their best to spread the gospel of better lighting and fixtures. They say they intend to make Milwaukee one of the best lighted cities in America. The general chairman of the Milwaukee committee is A. Polacheck, the other "live wire" chairmen and the various committees they are active in being as follows: F. E. Coffin, better lighting week; A. M. Kailing, publicity; Wm. Polacheck, reception; Chas. Geselschap, Sr., finance; Peter Sprecher, window display; Chas. Bridges, hotel reservation; Mrs. A. Polacheck, ladies' committee; Phil Polacheck, entertainment; Paul Burrell, registration, and H. E. Brauns, transportation.

A structure more admirably designed than the Milwaukee Auditorium for the holding of the

Milwaukee is planning a great week of activity for the entire Lighting Industry — The dates are from January 30 to February 4, 1922 — ARE YOU GOING?



FLOOR PLAN EXHIBIT SPACE
THIRD ANNUAL LIGHTING FIXTURE MARKET
MILWAUKEE AUDITORIUM
WEEK OF JANUARY 30 TO FEBRUARY 4 1922
SCALE 1/8" = ONE FOOT
136 BOOTHS

HEADQUARTERS
NATIONAL COUNCIL LIGHTING FIXTURE MANUFACTURERS
233 GORDON SQUARE BUILDING
DETROIT AVENUE AND WEST 65TH STREET
CLEVELAND, OHIO
CHAS. H. HOFRICHTER SECRETARY

N

Plan of Exhibit Space at the Milwaukee Auditorium for the Lighting Fixture Market, Jan. 30-Feb. 4, 1922.

Fixture Market and Joint Convention of the Associated Lighting Fixture Industries can not be imagined. Of huge size, covering an entire city block, it is the last word in modern equipment and skillful arrangement. The main hall, or "Arena," in which the convention meetings will be held, contains a seating capacity of over 8000 persons and 29,423 sq. ft. of exhibition space. Its acoustic properties are perfect; despite its huge size, an ordinary speaking voice can be heard with the utmost distinctness from the stage to the furthest end of the room.

Directly beneath the "Arena" is Mechanics Hall, the main exhibition room, where the Lighting Fixture Market will be held. The dimensions of this hall are 256 by 184 ft., with ample head room for the hanging of fixtures. These dimensions allow 46,800 sq. ft. of exhibition space, more than ample for the number of booths shown on the floor plan. The hall is completely and conveniently equipped with wiring for both a-c. and d-c. service. The exhibitor will find his booth perfectly equipped upon his arrival, with his goods moved in. All he has to do is to superintend the unpacking and to arrange his display.

Besides these two main halls there are six smaller auditoriums, office rooms, diningrooms, etc., in this mammoth edifice. The splendid modern facilities for cooking and serving of meals will permit pleasant lunches which have been features of former markets. The Auditorium is on Cedar street, between Fifth and Sixth streets, right in the heart of the main business district of Milwaukee, and it is a walk of but a minute or so to the leading hotels.

ELECTRICAL CREDIT ASSOCIATION TO MEET IN CHICAGO.

Trend of Times and Credits and Reconstruction Among Important Subjects to Be Discussed at 26th Annual Convention.

The Electrical Credit Association, Central Division, will hold its 26th annual convention at the Drake hotel, Chicago, Nov. 17-18. It is anticipated that there will be 300 or more of the principal electrical manufacturers and jobbers located in the territory from Ohio to the Rocky mountains and from the Lakes to the Gulf, present at this meeting.

An outline of the tentative program appeared on p. 706, Nov. 5, 1921, issue of ELECTRICAL REVIEW, since which time various additions have been made. The tentative program follows:

Thursday, Nov. 17—Informal reception and registration, Thos. G. Grier, chairman; S. E. Kennedy and W. P. Johnson, vice-chairmen; various committee reports; reports of territorial chairmen; report of nominating committee; election of officers; amendment of article V of by-laws relating to board of directors; new business; addresses on "The Trend of the Times" by Geo. A. Hughes, president, Edison Electric Appliance Co., Chicago; "Credits and Reconstruction" by E. W. Shepard, general credit manager, Western Electric Co., New York City; "How I Believe Difficult Credit and Collection Problems Should Be Handled During These Critical Times" by W. E. Sargent, credit manager, Cutler-Hammer Manufacturing Co., Milwaukee; "Supplemental E. C. A. Service" by Henry Schwab, treasurer, Monarch Electric & Wire Co., Chicago; "Value of E. C. A. Service" by T. C. Russell, president, Russell Electric Co., Chicago; "Cash Discounts" by H. E. Wilkins, Belden Manufacturing Co., Chicago; election of directors. A general discussion will follow each leader. The annual dinner will be in the French room; speakers: Harry F. Atwood and Senator John Dailey.

Friday, Nov. 18—Discussion on when and how to use the E. C. A. forms; addresses on "Accounting, Credit and Finance" by Stanley A. Dennis, New York City; "Creative Credit Management" by C. E. Vandel, Western Electric Co., Kansas City; "Sales Manager's Viewpoint of the Credit Department" by H. R. King, Phoenix Light Co., Milwaukee; "Hard Nuts to Crack" by A. V. Willett, Western Electric Co., Chicago; "The Viewpoint" by M. W. Scanlon, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; "Sample Credit and Collection Forms" by H. H. Pribbanow, Julius Andrae & Sons Co., Milwaukee; open parliament: systematic collection methods; association experiences; service pointers; delinquent municipal accounts; C. O. D. refusals; open questions and adjournment.

DENVER ELECTRICAL CO-OPERATIVE LEAGUE ACTIVITIES.

Advertising Campaign and Electrical Home Program Discussed—"Electrical Day" Featured at Meeting of Real Estate Bureau.

One of the most enthusiastic meetings in the history of the Electrical Co-operative League in Denver was held in that city Nov. 3. With over 100 representatives of all branches of the electrical industry present, a dinner, accompanied by special musical entertainment, followed by an impromptu program of talks, made up what has been recorded as a "red letter" night for the industry in that part of the Rocky mountain section.

On account of the co-operative advertising campaign just having been launched in Denver, an excellent opportunity was presented for going over the campaign. The fact that the contractor-dealers were represented in the campaign by 95% of their members was complimented by A. C. Cornell, chairman of the publicity committee and manager of the intermountain territory for the Western Electric Co., Inc. The seven electrical jobbers and the central stations have joined with the contractor-dealers in putting on the campaign of 4 mo. duration, it was reported. The progress of financing, building, equipping and arrangements for displaying the electrical home which is now being built in Denver under the auspices of the League were also discussed.

Among those who gave short talks were H. Alex Hibbard, A. E. Phinney, W. A. J. Guscott, L. M. Cargo, H. D. Randall, E. C. Headrick, B. C. J. Wheatlake, S. W. Bishop, P. J. Sullivan, the contractor who is building the house, and A. L. Callopy, representing the Hower Advertising Agency, which is conducting the co-operative advertising campaign for the League. T. O. Kennedy presided and the committee in charge was Clarence Keeler, H. Alex Hibbard and J. W. Ryall.

An "Electrical Day" was featured at the weekly meeting of the real estate bureau of the Denver Civic and Commercial Association Nov. 2, at

Milwaukee is planning a great week of activity for the entire Lighting Industry — The dates are from January 30 to February 4, 1922 — ARE YOU GOING?

which time the Denver Electrical Co-operative League had charge of the program. The part electricity is playing in the modern home, the education of the public in things electrical, and co-operation between the real estate interests and the electrical industry were stressed. T. O. Kennedy, chairman of the League's advisory committee, explained the electrical home movement and showed the realtors where every dollar spent in the electrical equipment of a home added $4 in value to the selling price of the property.

The personal experience of A. C. Cornell, chairman of the publicity committee of the League, in moving into an extremely desirable house supposedly modern but without any convenience outlets, was related by him as an example of the manner in which the majority of new homes have been constructed. The nature and the activities of the Electrical Co-operative League were explained by S. W. Bishop, executive manager of the League. Nearly 100 prominent real estate men attended the meeting. Many representatives of the electrical industry were also present and gave support to the message of "doing things electrically."

DISCUSS MUNICIPAL FINANCE AT NEW YORK MEETING.

Members of the New York Electrical League, at a meeting and luncheon at the Hotel Astor, Wednesday, Nov. 2, heard Charles L. Craig, comptroller of the City of New York, speak on the problems of municipal finance from the standpoint of the man responsible for the city's financial welfare. Mr. Craig devoted most of his time to explaining the many duties of the comptroller, outlining the various methods of procuring money to meet the city's expenses, and concluding with a recital of his efforts to secure state legislation by which public schools in New York could be built during the war and the opposition he encountered while engaged in this undertaking.

ENGINEERS WILL DISCUSS GREAT LAKES-ST. LAWRENCE CANAL.

The New York sections of the four national engineering societies—American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers and American Society of Civil Engineers—will hold their second joint meeting at the Engineering Societies building, 29 West 39th street, New York City, on Monday evening, Nov. 14, and the subject will be "The Great Lakes-St. Lawrence Canal."

Governor Henry J. Allen of Kansas will discuss the project from the standpoint of the producer of the Middle West, while Dr. R. S. Mac Elwee, former director of the Bureau of Foreign and Domestic Commerce and now director of the School of Foreign Service, Georgetown University, Washington, D. C., will speak on "The Greatest Single Step Along the Road to National Efficiency." "The Power and Transportation Features of the Project, Translated Into the Economics of New England and the East" will be the title of the paper to be delivered by H. I. Harriman, Boston. Ex-Governor W. L. Harding of Iowa is also expected to deliver an address.

JOINT MEETING OF A. I. E. E. AND MARINE ENGINEERS.

The 372nd meeting of the American Institute of Electrical Engineers, and the last for the year of 1921, will be held in the Engineering Societies building, 29 West 39th street, New York City, on Thursday, Nov. 17. In the afternoon a joint session with the Society of Naval Architects and Marine Engineers as a part of the annual meeting of that society will take place and the subjects of electric auxiliaries and electric propulsion of ships will be considered. "Electric Auxiliaries on Merchant Ships" is the title of the paper to be presented by E. D. Dickinson, marine department, General Electric Co., while W. E. Thau, commercial engineer, Westinghouse Electric & Manufacturing Co., will discuss the "Electric Propulsion of Ships." At the evening session, to which all interested are cordially invited, a lecture on "World Communication" will be given by Alfred N. Goldsmith, professor of electrical engineering, College of the City of New York.

Among the prominent electrical men recently returned from Europe are Gerard Swope, president, International General Electric Co.; Owen D. Young, vice-president, General Electric Co.; F. S. Terry and B. G. Tremaine of the National Lamp Works of General Electric Co., and Rex Cole, of the Duplexalite Works of General Electric Co.

COMING CONVENTIONS.

Electrical Credit Association, Central Division. Annual convention, Chicago, Nov. 17-18. Headquarters, Drake hotel. Secretary, Frederic P. Vose, 1343 Marquette building, Chicago.

Society of Naval Architects and Marine Engineers. Twenty-ninth general meeting, 29 West 39th street, New York City, Nov. 17-18. Secretary-treasurer, Daniel H. Cox, 29 West 39th street, New York City.

Electrical Supply Jobbers' Association, Atlantic Division, Cleveland, Nov. 30-Dec. 2. Headquarters, Hotel Cleveland. Secretary, E. Donald Tolles, 52 Broadway, New York City.

American Institute of Chemical Engineers. Fourteenth annual meeting, Baltimore, Dec. 6-9. Secretary, John C. Olsen, Polytechnic Institute, Brooklyn, N. Y.

American Building Exposition, new Cleveland Auditorium, Cleveland, Jan. 4-14. Assistant manager, R. G. Collier, 1305 Schofield building, Cleveland.

Western Association of Electrical Inspectors. Annual convention, Chicago, Jan. 17-19. Headquarters, Hotel Sherman. Secretary, William S. Boyd, 175 West Jackson boulevard, Chicago.

Lighting Fixture Dealers' Society of America. Annual convention, Milwaukee, Jan. 30-Feb. 2. Secretary, J. L. Wolf, Builders' Exchange, Cleveland.

National Council of Lighting Fixture Manufacturers. Annual convention and Lighting Fixture Market, Auditorium, Milwaukee, Jan. 30-Feb. 4. Secretary, Charles H. Hofrichter, 231 Gordon Square building, Cleveland

Milwaukee is planning a great week of activity for the entire Lighting Industry — The dates are from January 30 to February 4, 1922 — ARE YOU GOING?

THE FIXTURE MARKET

Items of Interest to Manufacturers, Jobbers and Dealers in Electrical Fixtures, Including Problems of Manufacture and Distribution

SHAPIRO & ARONSON REPRESENTED BY CHICAGO CONCERN.

Territory in Middle West Served With High-Quality Products by Chicago Lighting Fixture Co.

The show rooms of the Chicago Lighting Fixture Co., 28 West Lake street, Chicago, now display a very complete line of S & A fixtures manufactured by Shapiro & Aronson, Inc., 20 Warren street, New York City. N. W. Belmuth, of Shapiro & Aronson, in speaking of this Chicago store, said that it was the desire of his concern to give the dealers in the vicinity of Chicago the best opportunity to keep in touch with its line and to secure prompt and satisfactory service. Illinois, Wisconsin, Michigan and Indiana dealers are near enough to be able to receive shipments from Chicago stock on very short notice, and are close enough to bring in customers who desire to make selections from a complete line of samples. A complete stock is carried in Chicago to insure prompt shipments.

J. Salzman, of the Chicago Lighting Fixture Co., said that many dealers in his territory were not yet aware of the fact that S & A fixtures were available from his stock. He is endeavoring to get in touch with the trade in his territory as rapidly as possible in order to save time and needless expense in filling orders. His idea is to give the best of service, and give it promptly. The showrooms of the Chicago Lighting Fixture Co. are well arranged to afford a good opportunity to examine and study the various units on display, and Mr. Salzman invites the dealers of his territory to call and examine the line.

STREET LIGHTING EQUIPMENT FOR CHAMPAIGN, ILL.

Modern System Being Installed to Provide Improved Illumination—Over 500 Posts Being Provided at Present Time.

A strictly modern ornamental street lighting system is now being installed in the university district of Champaign, Ill., by the Commercial Lighting Co., Chicago. Work is now well along on the installation of 539 "Edgewater" posts supplied by the George Cutter Works of the Westinghouse Electric & Manufacturing Co. The system used for distribution of energy is a modification of the Chicago group lighting system, involving a general 5000-volt cable layout with low-voltage circuits to the various groups of lamps. The maximum potential of any point on the system to ground does not exceed 220 volts, so that safety is assured under all circumstances.

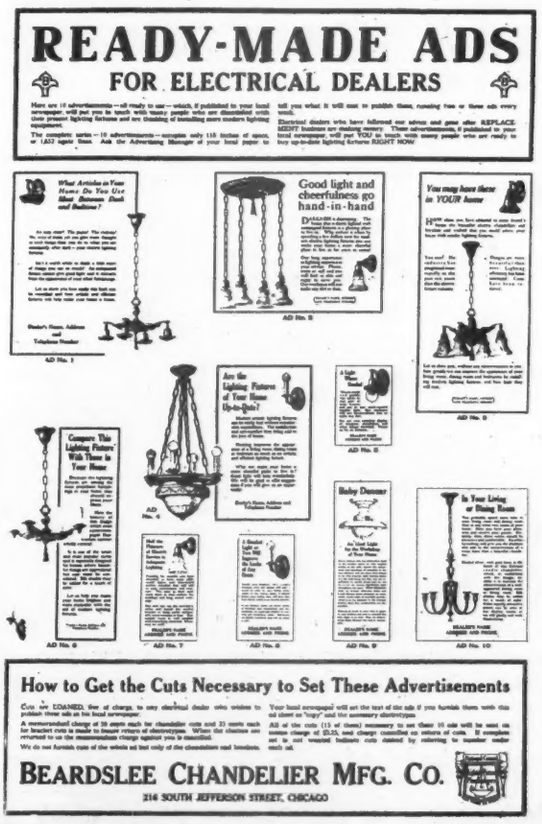
Two 34-kv-a. and one 10-kv-a. Westinghouse constant-current regulators are installed to feed the 5000-volt lines, and twelve 5-kv-a., 6.6-ampere primary, 6.6-ampere secondary manhole-type Westinghouse series transformers are installed to feed the group lamp circuits. The Commercial Lighting Co. reports that good progress is being made on the job and that the entire installation will probably be ready for service in about another month; that is, by the middle of December.

DEALERS PLEASED WITH SALES HELP FROM BEARDSLEE.

Free Cuts and Advertising Copy for Local Papers Used in Large Quantities by Contractor-Dealers in Many Localities.

The Beardslee local advertising plan is meeting with the complete approval of contractor-dealers all over the country, according to F. Lee Farmer of the Beardslee Chandelier Manufacturing Co., Chicago. Many dealers have used the first full series of advertisements prepared for them and returned copies of the local papers to the Beardslee company, indicating that they were pleased with the series and anxious to have it continued. Many dealers have frankly stated that the publicity has been of great value.

Mr. Farmer, in discussing this plan of local ad-


READY-MADE ADS
FOR ELECTRICAL DEALERS
Good light and cheerfulness go hand-in-hand
You may have these in YOUR home
How to Get the Cuts Necessary to Set These Advertisements
BEARDSLEE CHANDELIER MFG. CO.
214 SOUTH JEFFERSON STREET, CHICAGO

Reproduction of Sample Advertisements Prepared for Benefit of Contractor-Dealers.

vertising, pointed out the urgency of following up the general publicity with a definite move for business. As he pointed out, for every 10 persons "sold" on the idea of purchasing new fixtures as a result of reading a newspaper advertisement only one will come into the store to buy the new equipment. These other nine householders will put their name down on the "dotted line" if it is placed in front of them by the contractor-dealer, and Mr. Farmer urges the contractor-dealer not to neglect any means of following up this most effective campaign. He says there is plenty of business for the man who is interested enough to "go get it."

FIXTURE DEALERS ARE ORGANIZED IN LOS ANGELES, CAL.

Group of Nine Enterprising Institutions Join Forces in Order to Promote Better Relations and Improve Business.

That the men on the Pacific coast are alive to the advantages of combined business effort is shown by the organization of the Lighting Fixture Dealers' Society of Los Angeles. Nine of the progressive organizations in this city have taken the steps required to promote better relations and better business for all, and this in the end means increased prosperity for the entire community. The following list includes the names of the members of this new organization: Angelus Fixture Co., 213 West Fourth street; Beacon Light Co., 636 South Hill street; Norman Bishop, 220 West Fifth street; Bungalow Fixture Co., 1109 South Hill street; Harry Green, 1420 South Main street; Hall Electric Co., 336½ South Broadway; Meyberg Co., 630 South Grand avenue; Pacific Lighting Fixture Co., 113 West Ninth street, and Forve-Pettibone Co., 512 Broadway.

COOK-ART ILLUMINATING PRODUCTS CORP. LAUNCHED.

New Company Formed by Reorganization of National Illuminating Appliance Co.—Have Representatives in Many Cities.

D. C. Rosethal, general sales manager of the Cook-Art Illuminating Products Corp., 255 West 44th street, New York City, sees a bright future ahead of his company which has been formed as a result of the reorganization of the National Illuminating Appliance Co. M. K. Kassony is president and treasurer, and H. R. Cook is vice-president of the new organization, Mr. Rosethal being secretary.

The new organization with show rooms in the Brunswick building, New York City, opened about the first of the present month, is now ready to welcome the trade and display its product. The following comments pertaining to one of the products of the new organization should be of interest to the lighting industry:

"In many of the ancient cathedrals in Europe are wonderful windows made of a substance more beautiful than glassware, the secret of the making of which has long been lost. Scientists and artists have for years been endeavoring to analyze this material, but without avail; but now it would almost seem as though an American—Henri Raphael Cook, a well-known artist—had solved this problem of the ages. Certainly the material Mr. Cook employs in the treatment of a line of lamp shades produces a result at once startling and beautiful. The shades have the effect of a combination of leaded glass, silk and parchment, possessing the beauties of the three, being translucent, irridescent and artistic to a degree. The material lends itself to artistic adornment that is only limited by the capacity of the individual artist. The work of Turner, of Van Dyck, of Velasquez, of Reynolds, of da Vinci, or of any of the modern artists with brush or pencil can be reproduced thereon.

"Nor is the artistry all that the new line has to recommend it. The shades will stand wear and resist much more rough treatment than could be accorded glass or metal. Because of their nature they will neither bend nor break. They will withstand heat and can be washed as can a glass shade."

MILWAUKEE FIXTURE MEN BUSY WITH PLANS FOR CONVENTION.

Great Preparations Being Made to Welcome Visitors From All Parts of the Country to the Coming Gathering.

Phil Polacheck of Chas. Polacheck & Bro. Co., Milwaukee, writes that he has been more than busy with the Electrical Show recently held in Milwaukee and is now devoting much time to plans for the coming greater affair to be held in that city Jan. 30-Feb. 4, 1922. Milwaukee is certainly fortunate in having two such prominent electrical affairs for this season, and the electrical industry is equally fortunate in having a city like Milwaukee with live business men to put over such affairs in an effective manner.

H. A. BEST LAMP CO. REPORTS GOOD BUSINESS.

Many Orders Received Following Initiation of Policy to Supply Quality Product on Basis of Quantity Production.

That business is far from poor is evidenced by the fact that the H. A. Best Lamp Co., Chicago, is now working hard to keep up with the demand for the new table lamp which they announced only a month ago. This product has met with success even beyond the hopes of Mr. Best and his associates, and they feel that they will soon be required to extend their plant in order to meet the demand.

Good business methods coupled with good production practice allows the company to take advantage of every opportunity to turn out and market a meritorious article that the public demand is capable of absorbing in large quantities.

Milwaukee is planning a great week of activity for the entire Lighting Industry — The dates are from January 30 to February 4, 1922 — ARE YOU GOING?

APPLIANCES and DEVELOPMENTS

New, Improved or Interesting Electrical and Mechanical Apparatus and Devices, and Applications of Equipment and Methods in Practice

Features of the "Faries" Line of Portable Lamps.

A new line of ornamental portable electric lamps and adjustable floor portables has recently been placed on the

Adjustable Telescoping Floor Portable.

market by the Faries Manufacturing Co., Decatur, Ill., manufacturer of adjustable electric brackets, portable lamps, metal shades, fixtures, brass fittings, etc. Five of the portable lamps are shown in the accompanying illustrations, and are thus described by the manufacturer:

Adjustable telescoping floor portable—The shades will not pull off, but will swivel so that light can be thrown in any direction. No set screws to mar or scratch the finish in adjusting portables. Arm is adjustable to any angle and the fixture is adjustable in height from 2.5 to 5 ft. It is useful for reading rooms, study, or conservatory, in homes, offices, banks, hospitals and libraries. It is made with heavy stems and 9-in. heavy iron base covered with brass spinning and felt on the bottom of

Adjustable Portable With Heavy Cast Fancy Base.

Adjustable Portable With Extra Heavy Base.

base. The fixture is wired from the bottom for attaching to floor plug and is furnished in brushed brass, wired with 9 ft. of silk cord and equipped with key sockets, plug and shade.

Flexible arm portable with extra heavy base—The flexible arm "stays put" and there are no adjustment screws to bother with. Bushing is sweated to standard to prevent turning. The felt covered base cannot tip over. It is designed for

Adjustable Portable.

home, office, or factory. The height of the fixture is 26 ins., and it extends in any direction 16 ins. It is furnished in brushed brass and wired with 9 ft. of silk cord, socket, plug and shade being finished to match the portable.

Adjustable portable, with extra heavy base—This fixture is designed for the

Flexible Arm Portable With Extra Heavy Base.

piano, office desk, library table, or any place where an adjustable lamp is used. It is equipped with large tubing adjustable to any position. The height of the fixture is 18 ins., and it extends 24 ins. It is furnished in brushed brass and wired with 6 ft. of silk cord, socket, plug and shade being finished to match the portable.

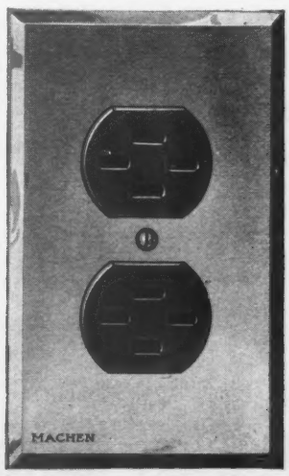
Adjustable portable—This is a practical as well as artistic portable for a bed, dresser or writing desk. It has a 7-in. brass shade and is frosted inside. The height of the fixture is 15 ins. It is furnished for 25 to 60-watt lamp in brushed brass outside, wired with 9 ft. of silk cord, and equipped with pull chain socket and plug.

Adjustable portable, with heavy cast fancy base—This fixture is equipped with a 12-in. flexible arm. The height is 14 ins., and it extends 18 ins. It is a practical as well as an artistic portable for the office or home. The fixture can be furnished in either statuary bronze or verde antique, and is wired with 9 ft. of silk cord, and equipped with socket, plug and shade finished to match the portable.

Machen Receptacle Made to Fit Any Standard Box.

The duplex receptacle with plate and the standard receptacle without plate, shown in the accompanying illustrations, are among the products manufactured by the Machen Electric Manufacturing Co., 4639 East Thompson street, Bridesburg, Philadelphia. This company also manufactures push button switches, flush standard receptacles, flush duplex receptacles, flush screw receptacles, ground clamps, bell push buttons of stamped brass and other electrical specialties.

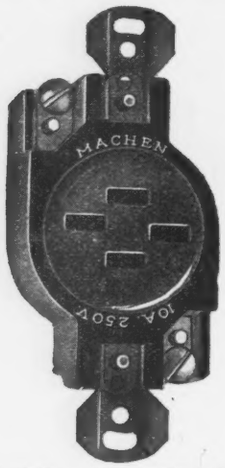
The contacts in the duplex and standard receptacles are set in under a shoulder in the porcelain base, so that it is impossible when inserting the plug to come down on top of the contacts with the possibility of bending the prongs of the plug or bending the contacts. This construction permits the use of narrow slots which tend to keep the dirt and dust out of the contact chambers. The standard receptacle in 1 in. deep and the duplex receptacle is ⅞ in. deep, thus



Duplex Receptacle With Plate.

allowing their use in shallow partitions.

The Machen receptable is designed so that polarity plugs may be used with them. The terminals are so located that



Standard Receptacle Without Plate.

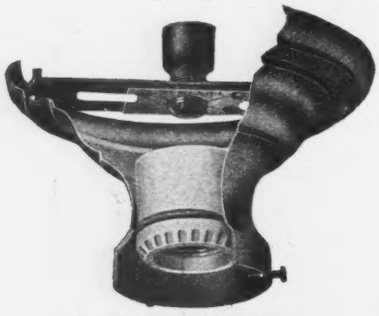
there is no danger of the binding screws coming in contact with the face plate. The porcelain boss that extends through the plate is glazed white or black. It is stated that the Machen receptacle will fit any standard box.

X-Ray Fixtures for Theater and Show Window Lighting.

The National X-Ray Reflector Co., 235 West Jackson boulevard, Chicago, has recently issued some descriptive literature covering the following subjects: Special designs of fixtures for theaters, showing an elaborate crystal fixture designed for the Palace theater, Peoria, Ill., by its designing department; eye comfort fixtures available in package form, illustrating one of the popular designs of X-Ray eye comfort lighting fixtures; variations in show window lighting; show window lighting and show case lighting.

Beardslee Safety-Board Holder and Ceiling Ring.

The Beardslee Chandelier Manufacturing Co., of Chicago, has issued two small leaflets describing its ceiling rings and the safety-board holder. The Beardslee ceiling ring is made in one



Beardslee Ceiling Ring.

piece of heavy gage brass and its pleasing lines will appeal to any discriminating architect or critical owner. It is stated that many dealers use these better quality ceiling rings because they cannot afford to jeopardize their reputation for good work by using cheap rings.

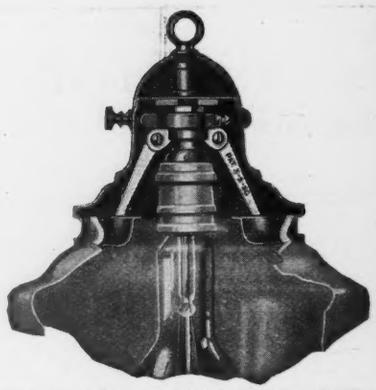
They are equipped with Beardslee patented, quick-action holding bars which permit the installation of the unit by forcing the spring clip, attached to the bar, over a fixture stud and then tightening two screws to bring the ring snug to the ceiling.

The safety-board holder was developed especially for large one-piece glass globes which may fall and cause damage when suspended bv the ordinary three or four-screw holder. The safety-

Beardslee Ceiling Light.

board holder grips the lip of the glass between the inside of the holder and two curved shoes extending nearly around the inner surface of the neck of the glass globe. The shoes provide a surface contact instead of a point contact, as in the case of the ordinary screw holder. The shoes are operated by a knurled screw through a simple lever mechanism and vibration cannot loosen their hold on the glass globe. The work of taking down and replacing glassware for cleaning is very simple. The person doing the work can hold the glass in one hand and with the other tighten or loosen the knurled screw. Even contact and perpendicular suspension are assured

Typical Lighting Unit Equipped With Safety-Board Holder.



Phantom View of Safety-Board Holder.

without reaching around the holder or placing oneself in a precarious position on the ladder.

Service to Lamps a Feature of Ivanhoe Book.

The Ivanhoe "Make It Pay" book recently issued by the Ivanhoe-Regent Works of General Electric Co., Cleveland, contains many sales-helps for the contractor-dealer on commercial, factory and home lighting. A conservative estimate puts the number of mills and factories in the United States at 140,000. It is the greatest of all-lighting fields. It creates one-third of the total demand for all lighting equipment. It is a field that requires intensive cultivation, but assures attractive rewards to the merchant who knows how to cultivate it and backs his knowledge by initiative and persistence.

Ten pages of the book are devoted to the subject of "Service to Lamps." The "Ivanhoe Keldon" and the "Ivanhoe Trojan" lighting units are illustrated and described, the ceiling types of both these units being recommended for kitchen lighting. The "Ivanhoe Iris" equipment for display window lighting is shown, together with other lighting units manufactured by the Ivanhoe-Regent Works. The book should prove useful to contractor-dealers contemplating a sales campaign on lighting units.

New Line of Wiring Devices for Electrical Appliances.

A new line of wiring devices, including several types of switches and connectors for household electrical appliances and motor-operated devices, has been developed and placed on the market by the General Electric Co.

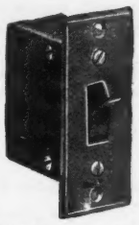
The G. E. compound through cord

Compound Through Cord Switch.

switch is made in a pattern which easily fits the hand. The circuit is opened and closed, not by pushing in a button, but by rotating a corrugated lever, with the thumb as the switch is held in the hand. It is made of black composition, is neat in appearance, compact in size, and has the well-known G. E. quick make-and-break action which eliminates the danger of burnt contacts when open-

ing the circuit on excessive loads. It is manufactured in two capacities—3 amperes, 250 volts, and 6 amperes, 125 volts.

For use on automobiles, washing machines, ironing machines, dishwashers, extractors, adding machines, operating



Miniature Single-Pole Flush Tumbler Switch.

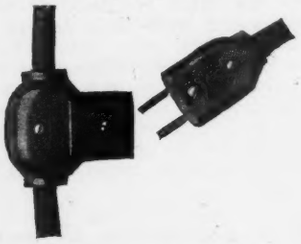
signals, or any appliance where a small switch is desirable, a new miniature single-pole flush tumbler switch has been devised. It has the same positive quick make-and-break mechanism described above, and is entirely inclosed in a composition box. This switch has been adopted by the Pullman Co. for use on all Pullman cars, and by the manufacturers of a number of household electrical appliances. It is rated at 3 amperes, 250 volts, and 5 amperes, 125 volts.

A miniature cord connector for use wherever a small separable connection is desired, such as for vacuum cleaners, sewing machines, soda drink mixers, fruit squeezers, etc., is another new product of the General Electric Co. It is only 2 9/16 ins. long and 7/8 in.

Miniature Cord Connector.

wide. The recesses in the fingers snap over raised points on the heavy phosphor bronze spring contacts, making a firm contact and preventing any possibility of the connector falling apart—a decidedly important requisite in the satisfactory operation of the kind of devices for which it is intended. The outer part is made of black composition. The device has a capacity of 660 watts, 250 volts.

Still another new product of the above company is a series tap connector. It is particularly applicable for attaching electrically-operated sewing machines. It is the same in material, finish, capacity, design and operation as the cord connector described above, with the addition



Series Tap Connector.

of the necessary connection to join it to the motor and the treadle of a sewing machine.

The company is also manufacturing an attaching plug for connecting the cord in the handle of vacuum cleaners to the motor. It has a one-piece body, and the binding screws on both sides of

Appliance Handle Switches With and Without Fiber Sleeve.

the base are covered by a fiber insulating sleeve. The contacts in the live end of the plug are concealed and out of the way of accidental touch. A motor plug for use in the body of motors, all made of composition, is also manufactured by the same company. The contacts on the free half of the plug are concealed, thus giving the same element of safety as the other type. Strong bent contact fingers make it impossible for the cap to fall off, and the base of the plug is held in the motor frame by grooves. A fiber separator in the bottom half of the plug is a precaution against short circuiting.

The use of either type makes it possible to remove the handles from the rest of the vacuum cleaner in packing for shipping.

The G. E. thumb button switch is adapted for vacuum cleaners and for

Vacuum Cleaner Plugs.

portable hand drills, valve grinders, blowers, vibrators, etc. It has a quick make-and-break mechanism, with all the advantage in eliminating the danger of burnt contacts. It is intended to be placed inside the handle of the device to which it is applied and, as its name indicates, it is operated by the thumb, a movement a quarter of an inch to the right or to the left operating the switch. It is rated at 3 amperes, 250 volts, and 6 amperes, 125 volts.

Another variety of switch for vacuum cleaners is the tubular type. The blades are insulated from the mechanism with heavy fiber washers and it has a powerful driving spring, flexible phosphor bronze switch blades and large headed binding screws with upset ends, which obviates the falling out of the screws in wiring—a decided advantage in facilitating assembly.

Improved Type of "Ajax" Plural Socket Plug.

A new item, known as the "Ajax" No. 33 plural socket plug, has been placed on the market recently by the Ajax Electric Specialty Co., 1011 Market street, St. Louis. This plug is made of cold molded heat-resisting composition and accommodates any style of standard lamp. It permits the use of a shade with the same shadeholder as used on ordinary weatherproof sockets, no special shadeholder being required. It is made with a solid center contact with no chance for breakage. The side socket on an angle allows the plug to be used on flush receptacle plate without removing or bending the door. The plug has a highly polished finish.

It is stated that the insulation of the improved "Ajax" plural socket plug is of great density and cannot be broken by ordinary handling. The main socket remains directly in line with the plug, allowing the lamp to hang in the position originally intended in the fixture, and with added strength of insulation over ordinary compositions the size of the "Ajax" plural socket plug remains small and allows the shadeholder ring on the main socket to accommodate an ordinary weatherproof shadeholder. In the diversified use to which this article has been put and to which it will be

No. 33 Improved "Ajax" Plural Socket Plug.

constantly subjected, every kind and style of plug or standard lamp base must give good contacts in the sockets. This, it is claimed, the improved "Ajax" plural socket plug allows and has been tested for all known uses.

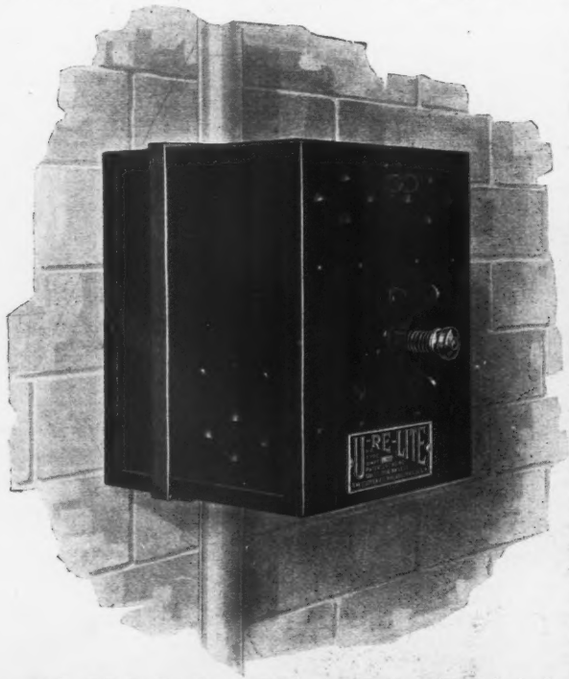
Toggle Switch with Adjustable Aligning Lugs.

Harvey Hubbell, Inc., Bridgeport, Conn., manufacturer of electrical specialties, has issued a folder illustrating and describing the new Hubbell toggle flush switches containing a new and better mechanism and adjustable aligning lugs. It is stated that because of their simplicity of movement and handsome appearance, toggle switches are coming into wide favor in this country. The "make" and "break" of the Hubbell toggle flush switch is practically instantaneous. The toggle arm operates at the same tension regardless of how long the current has been "on." This switch will always be tight against the wall, even after long and continuous service. Hubbell adjustable aligning lugs fasten the switch body flush with the plaster line, and decrease the labor of installing, it is stated.

"Denzar" Lighting Installations Outlined in Folder.

A new "Denzar" folder has been issued by the Beardslee Chandelier Manufacturing Co., Chicago, for the use of "Denzar" jobbers and dealers. The folder is 10.25 by 12.5 ins. and folds to 3.5 by 6.25 ins., so that it can be mailed in a No. 6 envelope. It is printed in a dark and light blue ink and makes an attractive inclosure. The inside spread shows eight typical "Denzar" installations, including a large office, an ice cream parlor, a school room, a shoe store, a hat shop, an automobile salesroom, the reception room of a dance hall and a drug store.

Elsewhere in the folder a sectional view and descriptions call attention to the distinctive features of "Denzar." The manufacturer claims the absence of glare, bright spots and shadows; the maximum use of all light rays; the dust-proof and bug-proof construction, and the ease with which "Denzar" may be cleaned, make it a satisfactory lighting unit. Space is provided on the outside for the jobber's or dealer's imprint.



"U-Re-Lite" Appliance Made by Cutter Electrical & Manufacturing Co.

Appliance for Protecting Power and Lighting Circuits.

The Cutter Electrical & Manufacturing Co., 19th and Hamilton streets, Philadelphia, manufacturer of flush switches and circuit-breakers, has recently placed on the market the "U-Re-Lite," an appliance for the protection of electric motors, power and lighting circuits from overloading. It does what fuses are intended to do, but it does this in a satisfactory manner and without attendant expense, the maker states. Upon operation it does not require renewal, but by a twist of the wrist may be easily reset. This appliance is made in capacities from 2 to 200 amperes, for a-c. and d-c. service. The main features of the device are thus enumerated by the manufacturer:

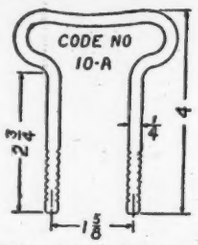
The "U-Re-Lite" is an I-T-E circuit-breaker inclosed in a specially constructed steel case from the front of which projects a convenient operating handle. It is, in a word, an electric safety valve. The "U-Re-Lite" is more than an appliance, it is the embodiment of an ideal; protection for the circuit and safety for the operator combined with continuity of service. It brings the electric circuit directly under the control of the user. Once installed it is always ready for service and requires no reloading or renewal parts. It combines protection for the circuit with safety for the operator, and by its use real savings in time, money and labor are secured.

When an overload occurs in a circuit protected by a "U-Re-Lite," it merely trips open the switch members of the "U-Re-Lite." To restore service, you grasp the handle projecting from the front of the box and "first to the left, then to the right," turn the handle, and "U-Re-Lite." Service is at once resumed without appreciable loss of time, without stoppage of production, without inconvenience or attendant expense, and without danger of contact with current carrying parts. It is stated that the "U-Re-Lite" will do this continuously—times without number, with unimpaired effectiveness.

The ease with which the "U-Re-Lite" may instantly be reset insures against loss of time and interrupted production, while its sturdy steel case insures the worker against accidental contact with live parts. The device is built on sound and well-tried principles. It embodies a circuit-breaker element for each side of the circuit. Each of these consists of a switch for closing and opening the circuit combined with an electro-magnet which is responsive to the flow of current and which opens the switch when the current exceeds the amount pre-determined as safe. There is no guess-work about the magnet and no variation in its workings; what it does once, it will continue to do with the precision of gravitation or solar movements; to change its operating point its adjustment must be changed; this can easily be done but only after removal of the inclosing steel case, which is normally locked in position.

Storage Battery Box Handle with New Feature.

A wire type of storage battery handle has recently been placed upon the market by the Mueller Electric Co., 2135 Fairmount road, Cleveland. These handles are made either plain or lead coated. The new feature of this device is a four-finger grip with legs on 1⅝-in. centers, which is the standard drilling with most battery box manufacturers. The Mueller company states that this makes a total of three wire type of handles it is offering in a standard way and two stamped steel handles.



No. 10-A Wire Type of Storage Battery Handle.

Schenley High School Lighted by Macbeth-Monax Globes.

Macbeth-Monax glassware for modern school lighting is the subject of a folder recently issued by the Macbeth-Evans Glass Co., Pittsburgh. An illustration is shown of the Schenley High School of Pittsburgh, which is lighted by Macbeth-Monax globes. A study room and two of the halls of the high school are also illustrated, showing the pleasing effects obtained in the use of Macbeth-Monax glass for such purposes. It is stated that very brilliant or dim light irritates the optic nerve, causing eye-strain. Macbeth-Monax glass transforms the harsh brilliancy of modern high-powered lamps into perfectly diffused soft illumination, easy to read by, hence ideal for a school room, as well as hygienic. Macbeth-Monax glass absorbs on the average less than 15% of the light. It is easy to clean, thus keeping at a minimum the upkeep expense necessary to maintain continued high efficiency.

O. J. Abell & Co., 29 South La Salle street, Chicago, has added to its existing lines in the machinery and machine products field representation of the Jefferson Forge Products Co., Detroit, maker of automotive forgings and the Jefferson one-piece drop-forged steel wheel; and the Pittsburgh Electric Furnace Corp., Pittsburgh, builder of the Moore 'Lectromelt furnace for the manufacture of electric steel, malleable and gray iron.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Carle Electric Co., Wheeling, W. Va., was recently organized by Ray L. Davis, J. H. Carle and J. E. Rehm.

Pittsburgh Reflector & Illuminating Co., Pittsburgh, has filed notice of increase in its capital stock from $50,000 to $75,000.

Trumbull-Vanderpoel Electric Co., Litchfield, Conn., has filed notice of increase in its capital stock from $200,000 to $250,000.

Moe-Bridges Co., 263 Broadway, Milwaukee, has issued a folder illustrating and describing its "Triple-7" wall bracket for domestic purposes.

Crescent Insulated Wire & Cable Co., Olden and Taylor streets, Trenton, N. J., plans to install new machinery and other equipment in its plant.

W. R. Ostrander & Co., 371 Broadway, New York City, has recently issued an illustrated folder on "Eveready" unit cells for flashlight batteries.

Ajax Battery Co., Canaseraga, N. Y., is perfecting plans for a plant unit to cost $50,000, for the manufacture of storage batteries for automotive and other service.

Macbeth-Evans Glass Co., Pittsburgh, has recently issued a folder entitled "Good Light for Stores," which illustrates the Macbeth lighting glass for store lighting.

E. D. Giberson & Co., Inc., who specialize in boiler tubes and manufacture steel tubing for all purposes, have moved their offices from 111 Broadway to larger quarters in the Barrett building, 40 Rector street, New York City.

Lamp Salvage Corporation of America, P. Sergardi, 501 West 145th street, New York City, recently organized with a capital of $500,000 to manufacture electric lamps, etc., has filed notice of change of name to the Phoenix Lamp Corp.

R. Williamson & Co., an Illinois corporation, has filed notice of organization to operate in New York for the manufacture of lighting fixtures and kindred equipment, with a capital of $100,000. S. T. Beatie, 224 Fifth avenue, represents the company.

Beardslee Chandelier Manufacturing Co., 218 South Jefferson street, Chicago, has issued a new net price list on illuminating glassware that it carries in stock and that is illustrated in its catalog G-S-1. The company states that it is in a position to supply this glassware to the dealer either in standard or in broken lots and make immediate deliveries from Chicago.

Coffin-Perry Co., with headquarters at Columbus, O., is the name of a new organization formed by Emory M. Coffin, formerly sales manager of the Pierce Fuse Corp., Buffalo, N. Y., and B. F. Perry, district manager of the same company in the Ohio territory. The new company will represent well-known manufacturers of electrical materials in the states of Ohio, Kentucky, West Virginia and Western Pennsylvania.

Lakewood Engineering Co., Cleveland, has issued a new booklet entitled "The Unbelievable 30%," which is designed to help convince people that the savings to be made by the proper use of industrial trucks and tractors are substantial enough to warrant the attention of the highest executives.

Robbins & Myers Co., 1418 Walnut street, Philadelphia, manufacturer of electric fans, motors, etc., with plant at Springfield, O., has leased a 1-story building at 229-31 North 23rd street, for a new local establishment. The property aggregates about 6000 sq. ft. of space.

Atlas Valve Co., 282 South street, Newark, N. J., has published its junior catalog No. 21 illustrating and describing "Atlas," "Ideal" and "Victor" reducing valves, pump governors, pressure regulators, hot water tank regulators, control valves and damper regulators.

Lamson Co., Lowell, Mass., manufacturer of conveyor systems, plans to erect a plant at Syracuse, N. Y., estimated to cost $500,000. Electric motors and considerable other electrical equipment will be installed. Recents bids for erection have been rejected and new bids are being asked.

Cutler-Hammer Manufacturing Co., Milwaukee, is distributing a pamphlet devoted to ac. automatic starter with mercury type overload relays, designated as Bulletin 9604. The theory of the new mercury interlock is given and curve included to show how tripping depends upon the time and the percentage of overloading.

The Cutter Co., Philadelphia, has announced that Maxwell B. Cutting, formerly of its Chicago office, has opened a branch at 1318 Chemical building, St. Louis. Mr. Cutting is skilled in matters relating to the proper protection of electrical circuits, machinery and associated devices and his knowledge should prove of service to the company's customers in the St. Louis territory.

Klymax Manufacturing Co., 115 North Desplaines street, Chicago, manufacturer of the "Klymax" electric vacuum washer, has announced that the Home Utilities Co. is now out of business and that the Klymax Manufacturing Co. has bought up the assets and is continuing the business. The officers of the Klymax Manufacturing Co. are: President and treasurer, Morris Klein; vice-president, John Negrescou, and secretary, David Froelich.

Detroit Seamless Steel Tubes Co., of Detroit, for over 20 yrs. manufacturer of seamless steel tubing, has again found it necessary, since occupying its new modern plant, to increase its sales staff. The position newly created is that of assistant general manager of sales and C. C. Rosser, the head of the department, has announced the appointment of C. H. Hobbs for this position. For over 14 yrs. Mr. Hobbs has been with the Lackawanna Steel Co. and for the last 5 yrs. has been the district representative in charge of the Detroit office.

Oliver Mfg. Co., Chicago, and the **Barth Mfg. Co.,** Milwaukee, both makers of jacks, etc., recently were consolidated under the name of the Oliver-Barth Jack Co., with factory and offices at 348-352 Milwaukee street, Milwaukee. Several months ago Milwaukee interests acquired the Oliver company and some time later these also purchased the property of the Barth company. The new organization is capitalized at $75,000. Officers are: President and general manager, Helmus B. Wells; vice-president, William O. Oliver and secretary and treasurer, Mackey Wells. In addition to these men, F. L. Sivyer and Pearson Wells, compose the board of directors.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued a publication known as folder 4474 and bearing the title "Lead Base Babbitt Metal," which announces the placing on the market of lead base babbitt metal. This babbitt metal is the result of many years' use of this material by the Westinghouse company. Approximately 1,000,000 lbs. of Westinghouse lead base babbitt metal was made and used during 1920. The subjects discussed in this publication are overheating, bearing design, preliminary machining of shells, cleaning of shells, care of tinning alloy, tinning of bronze shells, tinning of pipe and malleable iron bearing shells, anchor holes in castiron bearing shells, care of the babbitted metal, cleaning solutions and materials.

Aetna Electric Appliance Co., 40 Court street, Boston, has issued a new booklet showing diagrams of the Aetna water heating system. It is stated that in submitting the folder to architects, plumbers and dealers in electrical merchandise no attempt has been made to cover the entire field of application. The general interest in, and the widespread use of "Hotvent" water heaters (among other kinds of electric water heaters) has encouraged their use in fields of industry, such as vulcanizing, glue-pot heating, etc., where with proper automatic control their success is at once assured. Space has not been taken for specifications, care, maintenance or testimonials, but it is hoped that enough information has been given to lend the help that may be required in order to determine in a general way the manner in which a "Hotvent" water heater may be made useful in residences, offices, restaurants, etc.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

RAY KELLEY, Sherman, Tex., has become manager for the Texas Power & Light Co. at Commerce, Tex.

E. S. CUBBERLY has been elected secretary and treasurer of J. G. White & Co., Inc., 37 Wall Street, New York City.

EDWARD A. RICH has been appointed advertising and sales manager of the Electrol Manufacturing Co., Providence, R. I.

JOHN E. BREESE, formerly with the Western States Gas & Electric Co., Richmond, Cal., is now draftsman with the Solar Refining Co., Lima, O.

WILLIAM M. BROWN, formerly electrician with the Martinez Electric Co., Rawlins, Wyo., is now electrician with the Union Pacific Coal Co.

FRANK S. BIRD, formerly general superintendent of the Texas Construction Co., Olden, Tex., is now connected with the Oil Belt Power Co., Eastland, Tex.

J. E. CANNELL, formerly electrical engineer with Reeds & Thorpe, is now connected with J. J. Cannell, electrical contractor, 20 Chelsea street, Everett, Mass.

CARL J. KOCH, formerly instruction supervisor, School of Engineering of Milwaukee, is now switchboard engineer with the Western Electric Co., Chicago.

R. H. SPRING, formerly assistant to field electrical engineer of the American Railways Co., Philadelphia, is now manager of the Cape May (N. J.) Light & Power Co.

EARL M. NEWLIN, formerly assistant engineer of the Superpower Survey, is now connected with Goodwin, Newlin & Co., 133 South 12th street, Philadelphia.

A. D. HECKER, formerly foreman for the American International Shipbuilding Corp., Hog Island, Pa., is now electrician for the Arrow Electric Co., Philadelphia.

RICHARD H. OLSON, former partner in the firm of Pearson & Olson, is now connected with the Electrical Machinery Manufacturing Co., Minneapolis, as sales engineer.

EVERETT MORSS, president of the Simplex Wire & Cable Co., 201 Devonshire street, Boston, has been elected treasurer of the Massachusetts Institute of Technology. He was formerly secretary of the executive committee.

HOWARD W. MOTT, formerly connected with the Western Electric Co., 463 West street, New York City, is now in charge of instruction in electrical engineering at Stuyvesant High School, 345 East 15th street, New York City.

T. O. KENNEDY, who is chairman of the Advisory Committee of the Electrical Co-operative League of Denver and general superintendent of the Denver Gas & Electric Light Co., is a prominent figure in the electrical industry of the entire Rocky Mountain region. He is head of the committee which is building Denver's first fully equipped electrical home, and at the same time he is directing the affairs of the Rocky Mountain Geographic Division of the National Electric Light Association as its newly-elected president. Mr. Kennedy is the past-chairman of the Electrical Bureau of the Denver Civic and

T. O. Kennedy.

Commercial Association and has for some time directed the division committee on public utility information. Missouri claims Mr. Kennedy as a native son, he having been born at Poplar Bluff in 1886 and receiving his education in that state, graduating from the University of Missouri as an electrical engineer in 1907. He started with Henry L. Doherty & Co. at that time and since has been in charge of several of the company's properties. "Ted", as he is known, is, according to his associates, a real "live wire."

R. G. EMERSON, of the Northwest Electric Service League, is to meet the electrical contractors, dealers, electricians and company representatives of Grays Harbor county, Wash., at Aberdeen, on Nov. 17, to discuss the principles of advertising, as outlined by the league and by other electrical organizations. A second meeting is to be held on a later date at Hoquiam, Wash.

W. T. WALKER, construction engineer of the Northern States Power Co., Minneapolis, was elected president of the Northwestern section of the American Society of Civil Engineers at the annual meeting of that organization held in Minneapolis recently. Mr. Walker and J. J. Molyneaux, comptroller and auditor of the Northern States Power Co., addressed the convention on the subject of "The Making of an Annual Budget."

J. F. OWENS, vice-president and general manager of the Oklahoma Gas & Electric Co., Oklahoma City, has been re-elected president of the Oklahoma Public Health Association.

WILLIAM G. DOW, formerly of the industrial sales department, Westinghouse Electric & Manufacturing Co., is now testing engineer of the Commonwealth Edison Co., Chicago.

OBITUARY.

CAMILLUS GEORGE KIDDER, Orange, N. J., one of the organizers of the Essex County Electric Light & Power Co. of that city, died Oct. 20 at his home at 20 Fifth avenue, New York City. He was prominent in civic affairs and a member of the Essex County Park Commission. He was counsel and director of the Essex County Electric Light & Power Co. until it was absorbed by the Public Service Corporation.

JOHN F. MILLIKEN, for many years general manager of the Western Union Telegraph Co. at Boston, and prominent as an inventor of electrical devices, died at his home at 44 Virginia street, Dorchester, Mass., recently at the age of 87 yrs. He entered the employ of the American Telegraph Co., which later became the Western Union Telegraph Co., when 18 yrs. of age, and was manager in the Boston district for 25 yrs. He was the inventor of the Milliken repeater.

WILLIAM E. BAKER, a member of the firm of W. E. Baker & Co., consulting engineer, 105 West 40th street, New York City, died Nov. 7, aged 65 yrs. Mr. Baker designed the first bascule bridge over the Chicago river, and was the designer and general manager of the intramural railway at the Chicago World's Fair in 1893. He was later general manager and chief engineer of the Chicago west side elevated railway and went to New York City in 1899 to a similar position with the Manhattan elevated, installing the electrical equipment. Mr. Baker was an associate of the American Institute of Electrical Engineers.

JOHN F. WALLICK, aged 91 yrs., former superintendent of the Western Union Telegraph Co. and considered as one of the founders of the company in the Middle West, died Oct. 30 at his home in Indianapolis. Mr. Wallick entered the service of the company at Wooster, O., in 1851, and came to Indianapolis as manager of the Wade Telegraph Co. a short time later. The Wade company was consolidated with the Western Union and Mr. Wallick continued in the service of the new company until 1907 when he retired. He was one of the oldest men in point of service with the Western Union Telegraph Co. He was actively interested in public welfare and served for 36 yrs. as state treasurer of the Indiana Y.M.C.A.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Boston, Mass.—Electric motors and other industrial electrical equipment will be installed in the 1-story machine shop to be erected by the Meisel Press Manufacturing Co., Dorchester street. C. A. Meisel is president.

Brockton, Mass.—W. L. Douglas Shoe Co. will make extensions in the powerhouse at its local plant, to include the installation of new equipment. J. Williams Beals Sons, 62 Summer street, Boston, are architects.

Douglas, Mass.—Electric motors and other electrical equipment will be installed in the 1-story mill addition to be erected at the plant of the Hayward Woolen Co., estimated to cost $25,000. Plans are being prepared by C. T. Main, 201 Devonshire street, Boston, architect.

Hartford, Conn.—Connecticut River Power Co. has been granted permission by the Federal Power Commission, Washington, D. C., to utilize waters at Windsor Locks, Conn., for its proposed hydroelectric generating plant. The permit carries the stipulation that the company shall finance and commence work on the project within 24 months. C. H. Tenney, 201 Devonshire street, Boston, is engineer.

New Haven, Conn.—Electric conveying, hoisting and other haulage equipment will be installed on the docks and piers to be constructed by the Harbor Terminal Commission on the waterfront at an estimated cost of about $4,000,000. E. S. Nettleton is city engineer. H. McL. Harding, Grand Central Terminal, New York City, is consulting engineer for the project.

New Haven, Conn.—The board of finance has authorized the installation of an electric traveling crane at the city wharf; cost not to exceed $12,000.

Norwalk, Conn.—Considerable electrical equipment will be installed in the factory addition to be erected at the plant of the Norwalk Lock Co. The T. J. Pardy Construction Co., Bridgeport, Conn., has the construction contract.

Brooklyn, N. Y.—Considerable electrical equipment, including motors, etc., will be installed in the 1-story ice plant to be erected by the Knickerbocker Ice Co, 1480 Broadway, New York, on 36th street, Brooklyn, estimated to cost $75,000.

Buffalo, N. Y.—Niagara, Lockport & Ontario Power Co., Marine Bank building, has made application to the Public Service Commission for permission to acquire the Jamestown Lighting & Power Co. and the Western New York Electric Co., both of Jamestown, N. Y. A petition has also been filed asking for permission to issue bonds for $374,000 to carry out the acquisition.

Buffalo, N. Y.—Considerable electric equipment and machinery will be installed in the feed and flour mills and grain elevators to be erected by the American Grain & Feed Corp., 303 Chamber of Commerce building, on the waterfront, estimated to cost $400,000. L. R. Veatch, 528 Pratt street, is engineer.

Buffalo, N. Y.—The city commission is planning the installation of an improved street arc lighting system on Main street, from Carlton street to the city line; and on Elmwood avenue, between North and Virginia streets, and in the vicinity of the Hotel Statler. A total of over 320 lamps will be required. Commissioner Kreinheder is in charge.

Buffalo, N. Y.—Electrically operated machinery will be installed in the 3-story food products plant to be established by Wm. F. Lipp at 16-18 Emerson place.

Flushing, L. I., N. Y.—Considerable electrical equipment will be installed in public school No. 72, to be erected on Maspeth avenue by the board of education, Park avenue and 59th street, New York, including electric motors, mechanical draft equipment, etc. It will cost $470,000. C. B. J. Snyder, Municipal building, New York City, is architect.

Monroe, N. Y.—Orange & Rockland Electric Co. is planning a housing development for employes. Plans have been drawn for a number of houses.

Newport, N. Y.—Newport Electric Light & Power Co. has filed notice of increase in its capital stock from $15,000 to $100,000.

New York, N. Y.—International Mercantile Marine Co. has discontinued the operation of its private electric power plant for the operation of its building at 1 Broadway, and in the future will use central station service from the New York Edison Co.

New York, N. Y.—Considerable electrical equipment will be installed by the Anheuser-Busch Co., 979 Brook avenue, in connection with the erection of an addition to its local ice manufacturing plant, including improvements in the present plant, estimated to cost $200,000.

New York, N. Y.—The Power Co., 30 North Church street, has acquired the Grafton Power & Electric Co.'s power plant and will improve the generating plant with the installation of new equipment and will operate the plant in conjunction with the new generating station at Logan, W. Va., as well as with the proposed new hydroelectric plant on the Cheat river at Caddell, near Kingwood. Cost $1,500,000. Address N. M. Argabrite, vice-president and general manager.

New York, N. Y.—Grover A. Whalen, Commissioner of Plant and Structures, Municipal building, has tendered an application to the board of estimate for an appropriation of $177,700, for the new municipal trackless trolley system to be installed between Richmond and Tottenville, S. I. The work will include the installation of an electric generator at the present Sea View power plant; automatic substation; construction of transmission line from the power plant to Richmond and of about 9 mi. of overhead electric feeder lines; and seven trackless trolley cars.

New York, N. Y.—Electrically operated freight handling machinery and other electrical equipment will be installed by the city in connection with the proposed new belt line railroad, extending from Haworth, N. J., to Brooklyn, by way of Staten Island, estimated to cost $141,000,000. The board of estimate has approved a report for the project. Grover A. Whalen, Commissioner of Plant and Structures, Municipal building, is in charge.

Camden, N. J.—Considerable electrical equipment will be installed in the railroad terminal to be constructed here by the Philadelphia & Reading Railroad Co., Philadelphia, Pa., estimated to cost $5,000,000, including a new ferryhouse.

Elizabeth, N. J.—The Union Township Committee is negotiating with the Public Service Electric Co. for extensions in its lines on Stuyvesant avenue, for service to new consumers in this section. A petition will be filed with the Board of Public Utility Commissioners requesting such extension without cost to consumers.

Jersey City, N. J.—Public Service Electric Co. has filed plans for the erection of a building at its works at 1065 Garfield avenue.

Montclair, N. J.—The Board of Commissioners is arranging an ordinance providing for the installation of a number of new "white way" street lighting systems in different sections of the city. The most important installation will include one hundred fifty eight 600-cp. lamps on Bloomfield avenue for its entire length, from the Glen Ridge line to the Verona borough line.

Newark, N. J.—Electric equipment will be installed in the building to be erected by the Celluloid Co, 290 Ferry street, at Niagara and Wescott streets, estimated to cost $200,000.

Taylortown, N. J.—The borough trustees have awarded a contract to the Watson-Flagg Engineering Co., 120 Liberty street, New York City, for the construction of a new pumping plant for the municipal waterworks, estimated to cost $11,700.

Wilmington, Del.—The city council has completed the installation of a new lighting system in Rodney square.

Wilmington, Del. — Considerable electrical equipment will be installed

in the proposed additions to be constructed at the municipal garbage disposal plant. The city council is now studying details of the project prior to the adoption of an ordinance.

Bellevue, Pa.—The common council is arranging for a bond issue of $87,000 for a garbage disposal plant and other municipal improvements. Considerable electrical equipment will be installed.

Harrisburg, Pa.—The city council has approved an ordinance for the installation of an improved street lighting system on North Second street, from Walnut to State streets.

Heidenberg, Pa.—Duquesne Light Co., Pittsburgh, has received a 5-yr. lighting contract from the common council, Heidenberg, for furnishing street lighting service.

New Brighton, Pa.—Electric motors and other industrial electrical equipment will be installed in the 3-story plant addition to be constructed by the Townsend Co., Fallston avenue, manufacturer of bolts, nuts, wire products, etc.

Philadelphia, Pa.—The Department of Transit, City Hall, will take new bids at an early date for construction of its proposed electric substations at Cumberland and Kensington streets, for the rapid transit system. The department has arranged for the installation of a new underground conduit system on Front street, from Arch to Jefferson street, for the Frankford Elevated railway lines, estimated to cost $44,900. W. S. Twining is director.

Philadelphia, Pa.—Considerable electrical equipment, including motors, etc., will be installed in the new 10-story office building to be erected at 1513-21 Sansom street, by J. Wallace Hallowell, Broad and Chestnut streets, estimated to cost $200,000.

Philadelphia, Pa.—A powerhouse will be installed at the plant of the Glenwood Distilling Co., Aramingo and Tioga streets. Plans have been filed.

Philadelphia, Pa. — Considerable electrical equipment will be installed in the 3-story baking plant to be erected by the Mayer Baking Co., 60th and Cedar streets, on 55th street, and estimated to cost $130,000.

Pittsburgh, Pa.—Philadelphia Co., 435 Sixth avenue, operating public utility properties, has arranged for a bond issue of $16,000,000, for general operations, extensions and improvements in plants, etc.

Pittsburgh, Pa.—Electric motors and other industrial electric equipment will be installed in the ice and refrigerating plant to be erected by the Tech Food Products Co., 3340 Liberty avenue, at 36th and Butler streets.

Punxsutawney, Pa.—Rochester & Pittsburgh Coal & Iron Co. has construction under way on a power plant, with initial capacity of about 3000-hp., to be used for power supply for mining properties in the Helvetia section.

Wilkes-Barre, Pa. — The Public Service Commission has placed a valuation of $4,800,000 on the properties of the Luzerne County Gas & Electric Co., covering electric power plants and lines exclusively, for rate making purposes.

Snow Shoe, Pa.—Lehigh Valley Coal Co. will install an electrically operated pumping unit at its plant with capacity of about 3000 g.p.m.

Uniontown, Pa.—Fayetteville Township Electric Co. and the Greene Township Electric Co. have been granted permission by the public service commission to operate in certain sections of Franklin county.

Baltimore, Md.—Considerable electrical machinery will be installed in the plant to be erected by the Patuxent Clay Products Co., 206 Water street, recently organized with a capital of $1,000,000. The factory will cost about $150,000.

Baltimore, Md.—The board of city charities has authorized the placing of the city power plant at Bay View under the direction of Edward G. Rost, mechanical engineer of the Water Department for experimental purposes. Particular study will be given to power equipment efficiency, coal, etc.

Baltimore, Md.—Consolidated Gas, Electric Light & Power Co., Lexington building, has tentative plans under way for a number of improvements and extensions in its electric power plants and system.

Frostburg, Md.—John Brydon and associates have acquired the property of the Potomac Coal Co. and plan extensive operations. New electrical and other machinery will be installed.

Cleveland, Va.—Cleveland Light & Power Co. has been incorporated with a capital of $10,000, to establish and operate a local light and power system. S. C. Couch is president, and D. E. Campbell secretary.

Lowesville, Va.—L. V. Parr, proprietor of Amherst Telephone Co., Amherst, Va., and others are interested in establishing telephone lines in the vicinity of Sandidges and Lowesville with Amherst and Lynchburg.

Lynchburg, Va.—The city council has approved a 5-yr. street lighting contract with the Lynchburg Traction & Power Co. The council has also authorized negotiations with the Chesapeake & Ohio Railway Co., relative to securing a water power site for the construction of a municipal hydroelectric plant at a later date.

Buchanan, W. Va.—Buchanan Light & Water Co. has filed notice of increase in capital from $25,000 to $50,000 for proposed expansions. Work is under way on extensions and improvements in the company's plant and system.

Iaeger, W. Va.—United Light & Power Co. has been incorporated with a capital of $25,000, to operate an electric light and power system in this section. The company is headed by F. B. Lamb, H. P. Musser and C. H. Elston, of Charleston, W. Va.

Lansing, W. Va.—Mountain Cove Telephone Co. has increased its capital to $24,990 and has also changed its name from Lansing Telephone Co.

Man, W. Va.—Man Power & Light Co., recently organized, is planning the installation of a new light and power system throughout this district. A franchise has been asked.

Shelby, N. C.—Post Road Gin Co. is planning to equip its cotton ginning plant for electric operation. A power line will be constructed for service at the mill.

Atlanta, Ga.—Georgia Railway & Power Co. has disposed of a bond issue of $4,000,000, the proceeds to be used for general operations, extensions, improvements, etc.

Louisville, Ga.—The light and water plant has recently been destroyed by fire with a loss of $20,000. Address Mr. Cox, superintendent.

Plains, Ga.—The common council is arranging for a bond issue for the installation of an electric lighting system.

Branford, Fla.—C. E. Camp and associates are planning the erection of an electric lighting plant for local service. An ice-manufacturing plant will also be constructed.

De Land, Fla.—Electric Light & Ice Co. will expend $75,000 in improving its plant.

Lakeland, Fla.—The city council is perfecting plans for construction of a new power line to Lakeland Highlands and Haskell, about 8 mi. distant, to furnish light and power service from the municipal electric plant in this section.

Pensacola, Fla.—The Federal Power Commission has issued a preliminary permit to A. Reed Bingham of Pensacola for a comprehensive power development on the Perdido, Styx and Blackwater rivers in Florida and Alabama. A series of three low-head dams are proposed; the powerhouses to be located at the base of the dams, and it is expected that an installation of 1000 hp. in each plant will be feasible.

NORTH CENTRAL STATES.

Delphos, O. — Northwestern-Ohio Light Co. will build a separate power line from Delphos to Van Wert. Address local superintendent.

Toledo, O.—Toledo Edison Co., formerly the Toledo Railways & Light Co., has taken over the plant of the Acme Power Co. for extensions in its system. The company has arranged for an increase in its capital stock from $15,000,000 to $25,000,000 for general expansion.

Warren, O.—Ohio Public Utilities Co., operating at Warren, Massillon, Alliance, Ohio, and vicinity, has arranged for a bond issue of $5,100,000, for general operations, plant extensions and improvements, etc.

Lansing, Mich.—City Engineer Otto E. Eckert is preparing estimates for the placing of boulevard lamps along Linden avenue.

Albion, Ind.—Contract for the equipment of the city's new light plant has been let to the John L. Skeldon Engineering Co., Toledo, O.

Denver, Ind.—The town committee has arranged for the installation of an electric lighting system. Power will be furnished by the Winona Interurban Railway Co. with line connection at Chile, Ind.

Kokomo, Ind.—J. M. Leach Manufacturing Co. is having plans prepared for the erection of an electric power plant at its factory.

Mitchell, Ind.—E. E. Dean, Indianapolis, Ind., has negotiated for the purchase of the Mitchell electric light plant for $45,000, subject to the approval of the Indiana Public Service Commission. One-half of this amount is to be paid Dec. 31, when the transfer is made and the remainder at the rate of $4500 per annum. Mr. Dean has contracted to operate the water business of the town as well.

Union City, Ind.—Union City Electric Co. has increased its capital stock from $50,000 to $100,000.

Atlanta, Ill.—The transmission line between Atlanta and Lincoln, estimated to cost $35,000, will be financed and built by eastern stockholders of the Lincoln Water & Light Co.

Bloomington, Ill.—Standard lamps being found more satisfactory, the members of the city council hope a petition will be circulated among the property owners asking that such lamps replace the arc lamps. Address the city clerk.

Centralia, Ill.—The city engineer has been authorized to rush plans for the "white way" movement. Address the mayor.

Chicago, Ill.—Bids were received Nov. 8 for furnishing 10,900 globeholders for ball globes. Address Wm. G. Keith, commissioner of gas and electricity, room 614, City Hall.

Decatur, Ill.—Decatur Railway & Light Co. will expend $8500 for the installation of new 100-lb. rails on its street car tracks in North Jasper street, from Leafland avenue, north to Garfield avenue. Address M. L. Harry, manager.

Jacksonville, Ill.—Members of the boulevard light committee held a special meeting to consider types of lamps for the new boulevard lighting system. Address F. E. Farrell, member of committee.

Lena, Ill.—Plans for extension of operations of the Lena Electric Light & Power Co. include the rebuilding of the dam across the Pecatonica river at Martintown, Wis., also for the erection of a powerhouse there. A large force of men has been working on this project, but the scope of work is such that it cannot be completed before the first of the year. The improvements will involve an expenditure of between $120,000 and $150,000. Address C. E. Berhenke, president.

Sullivan, Ill.—Manager Howard F. Hough of the municipal electrical department is making plans to care for the additional customers the city plant will receive when the Central Illinois Public Service Co. removes its system from the streets and discontinues business here.

Exeland, Wis.—It is reported that plans are being considered to install street lamps in the town. Address the mayor.

Ft. Madison, Ia.—The city council passed a resolution adopting a contract with the Fort Madison Electric Co. for supplying electrical energy for the lighting of the "white way" system that will be installed on the streets of the business section. The contract calls for installation and operation of the system prior to July 1, 1922. Address the mayor.

Peterson, Ia.—Western Iowa Power Co. has been incorporated with a capital stock of $250,000. D. McMillan, president; A. O. Anderson, vice-president; and A. W. Jones, secretary and treasurer.

Edina, Mo.—The town of LaBelle has voted to get electric current from the Edina Light Co. The work of building the line from Knox City to LaBelle will be started at once. Address M. C. Hunter, Edina, Mo.

Jamesport, Mo.—An election will be held to vote on the question of issuing bonds for the construction of an electric line to Trenton. Address manager of Gas & Electric Co., Trenton, Mo.

Kansas City, Mo.—Kansas City Light & Power Co. has made application for authority to construct an electric transmission line from Parkville to Farrell View, Platt county, Mo.

Knob Noster, Mo.—Knob Noster Mutual Telephone Co. has recently been organized. A switchboard and central office are to be established. Address P. G. Utley, chairman.

Leeds, Mo.—Considerable electrical equipment will be installed in the proposed new local plant of the Kansas City Spiral Pipe Co., 416 Dwight building, Kansas City, Mo. A large tract of land has been acquired.

Platte City, Mo.—Platte Valley Light & Power Co. has completed negotiations for the purchase of the existing electric lighting plants at Smithville and Weston, Mo., and will utilize the stations for extensions in its system. For additional power supply, a new transmission line will be constructed from Smithville to a connection with the power lines of the Kansas City Power & Light Co., at Fairview, Mo.

Pawnee City, Neb.—Light and power plant bonds to the amount of $75,000 have been voted. Address the mayor.

Groton, S. D.—Bonds amounting to $30,000 for waterworks and $10,000 for light plant have been voted. Address the mayor.

SOUTH CENTRAL STATES.

Georgetown, Ky. — The common council is arranging a bond issue of $100,000 for the installation of an electric lighting system and municipal waterworks.

Pikeville, Ky.—Kentucky & West Virginia Power Co., 30 Church street, New York City, has tentative plans under way for erection of an electric generating plant in the Big Sandy district. A transmission line will be constructed to tie in the plant with other generating stations of the company. Francis R. Weller, Hibbs building, Washington, D. C., is consulting engineer for the company.

White Pine, Tenn.—White Pine Power & Light Co., G. M. Felmet, owner, will erect a fireproof powerhouse and will install a 100-kw. steam outfit.

Birmingham, Ala.—Alabama Power Co. has active construction under way for erection of its new hydroelectric generating plant on the Coosa river, near Verbena. The entire development is estimated to cost $6,000,000.

Lambert, Miss.—Citizens have approved of a bond issue as arranged by the common council, totaling $30,000, for the installation of an electric system and certain street improvements.

Hammond, La.—Bonds have been voted for extending and improving the lighting system. Address the mayor.

Crescent, Okla. — The Common Council is perfecting plans for the installation of a new municipal electric system. Bonds for $60,000 have been approved.

San Angelo, Tex.—In the valley of the Colorado river in Coke, Runnels, Tom Green and Concho counties, 128 sq. mi. of land have been surveyed and mapped for erecting a great dam across the stream near Bronte. Address C. C. Holder, chief of survey.

Tahoka, Tex.—The attorney general has approved an issue of $18,000 worth of 6% electrical bonds. Address the mayor.

Waco, Tex.—The city commission is planning the installation of a new street lighting system on the river driveway, from Washington avenue to Cameron Park.

WESTERN STATES.

Lava Hot Springs, Ida.—The village has applied for a permit to construct a dam 7 ft. high at a point in Portneuf river known as Beaver Falls, to generate electricity for light and power purposes. The estimated cost of the project is $30,000. Address the mayor.

Marcus, Wash.—Citizens have voted in favor of the proposed development by the Washington Water Power Co. of Kettle Falls power site on the Columbia river. Address V. H. Greisser, chief engineer of the above company.

Seattle, Wash.—An ordinance has been passed by the city council providing for $40,000 worth of light and power extensions. Address city purchasing agent.

INCORPORATIONS.

Milwaukee, Wis.—Paradox Battery Manufacturing & Service Co. Capital, $15,000. To manufacture, deal in and repair storage batteries. Incorporators: Gust J. Guse, A. L. Trechsel and William A. Willis, 885 Seventh street.

Lost Nation, Ia.—Lost Nation & Keystone Telephone Co. Capital, $1000. A. J. Skinner and M. Mulvihill, both of Oxford Junction, are directors.

Pittsburgh, Pa.—Moorehead Electric Machinery Co. To manufacture electrical machinery and parts. Incorporators: I. R. Moorehead, 3417 Kedzie avenue, and others.

Lion, Pa.—Ohio Generating Co. To manufacture farm lighting plants and systems. Incorporators: C. S. LaMotte, Charles C. Meads and others.

Wilmington, Del.—Ray Battery Co. of Detroit, Mich. Capital, $1,000,000. To manufacture electric batteries and other electrical products. Incorporators: Joseph S. McDowell and M. J. Holliday, Detroit. The Corporation Trust Co. of Delaware, Equitable building, Wilmington, represents the company.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Gold Bond Offering of Manitoba Power Co. of Canada.

E. H. Rollins & Sons, Spencer, Trask & Co. and Kissel, Kinnicutt & Co., Chicago, are offering a new issue of $3,000,000 Manitoba Power Co., Ltd., first mortgage 7% sinking fund gold bonds, series "A," dated Nov. 1, 1921, and due Nov. 1, 1941, at a price of 90 and interest, to yield about 8%. The Manitoba Power Co., Ltd., incorporated under the Companies Act of Canada, was formed for the purpose of developing and furnishing additional hydroelectric power for the Winnipeg Electric Co. and its subsidiaries, which own and operate an extensive electric railway, light and power system serving Greater Winnipeg and the surrounding territory, having a population estimated to exceed 275,000.

Offering of Sangamo Electric Co. First Mortgage Gold Bonds.

Elston, Allyn & Co., Chicago, is offering an issue of $500,000 Sangamo Electric Co. 8% first mortgage sinking fund gold bonds at par and accrued interest to yield 8%. The Sangamo Electric Co., incorporated in 1899, manufactures alternating and direct-current watt hour and ampere-hour meters, rotating standard dual mechanisms, circuit-breakers, shunts and electric switchboard meter auxiliaries. It is stated that the average annual net earnings of the company for the 8 mo. ending Aug. 31, 1921, were at the rate of over five times the maximum annual interest charges.

Detroit Edison Co. and Subsidiaries.

Earnings for the 9 mo. ended Sept. 30, 1921, with comparisons with the same period of 1920 are as follows:

	1921.	1920.
Gross	$16,778,875	$15,474,217
Net after taxes	4,217,902	2,768,472
Surplus after interest charges	1,693,455	1,038,202

Note—Included in operating expenses in 1921 for renewal, replacement and contingent reserve is $930,000, against $400,000 last year.

Cities Service Co.

For September—	1921.	1920.
Gross earnings	$ 720,269	$2,074,085
Net for stock	510,945	1,844,886
Preferred dividends	404,506	398,579
Balance for common and reserve	106,439	1,446,307
For the 12 mo. ended Sept. 30—		
Gross earnings	15,866,065	23,818,909
Net for stock	13,196,758	21,187,850
Preferred dividends	4,832,722	4,575,141
Balance for common and reserve	8,364,036	16,612,709

Keystone Telephone Co.

	1921.	1920.
September gross	$ 143,182	$ 149,184
Net after taxes	59,302	49,925
Surplus after interest charges	19,365	13,271
9 mo. gross	1,297,122	1,298,604
Net after taxes	444,137	438,152
Surplus after interest charges	91,763	114,434

Indianapolis Company Buys Stock of Connersville Utility.

The Interstate Public Service Co., Indianapolis, has received permisison from the Indiana Public Service Commission to exchange its 7% prior lien stock at equal value for $325,900 of the first preferred accumulative 6% stock and $54,800 second preferred accumulative 7% stock of the Hydroelectric Light & Power Co. of Connersville, Ind. This gives the Interstate company complete ownership of the Connersville company. A short time ago the Interstate company petitioned and received authority from the Commisison to take over the common stock of the Hydroelectric company owned by E. D. Johnston with $210,000 of its 7% prior lien stock. Mr. Johnston was president of the Connersville Hydroelectric Co. The Interstate Public Service Co. owns the plant at Newcastle, Ind., and will connect the Connersville plant and the Newcastle plants and then later connect the two with the main system at Shelbyville, Ill. The Connersville company's physical property on a 1916 basis is worth $605,000, according to a valuation made by engineers of the Indiana Public Service Commission. The company has out $325,000 of 6% preferred stock and $54,800 of 7% preferred stock.

Metropolitan Edison Co.

Earnings Statement.

	August, 1921.	August, 1920.
Operating revenue	$204,006.27	$227,115.30
Operating expenses, maintenance, taxes and rentals	132,777.54	200,088.01
Operating income	71,228.73	27,027.29

Statement of balance of net income for the 12 mo. ended Aug. 31, 1921 and 1920:

	1921.	1920.
Operating revenue	$2,771,963.92	$2,595,173.92
Operating expenses and taxes	1,478,169.79	1,450,709.70
Maintenance	360,069.70	323,360.60
Rentals	36,750.00	36,750.00
Total operating expenses, maintenance, taxes and rentals	1,874,989.49	1,810,820.30
Operating income	896,974.43	784,353.62
Other income	127,437.41	108,513.35
Total income	1,024,411.84	892,866.97
Deductions from income:		
Interest on funded debt	445,013.09	408,335.74
Other deductions from income	166,872.46	107,513.66
Total deductions from income	611,885.55	515,849.40
Net income	412,526.29	377,017.57
Provision for dividend on preferred stock	173,543.72	149,166.66
Balance of net income	238,982.57	227,850.91

Pennsylvania Edison Co. and Subsidiaries.

Earnings Statement.

	August, 1921.	August, 1920.
Operating revenue	$186,862.63	$186,271.39
Operating expenses, maintenance, taxes and rentals	139,746.75	149,640.12
Operating income	47,115.88	36,631.27

Statement of net income for the 12 mo. ended Aug. 31, 1921 and 1920:

	1921.	1920.
Operating revenue	$2,544,178.74	$2,017,148.06
Operating expenses and taxes	1,478,819.41	1,233,217.93
Maintenance	349,894.74	263,926.59
Rentals	29,448.54	29,490.12
Total operating expenses, maintenance, taxes and rentals	1,858,162.69	1,526,634.64
Operating income	686,016.05	490,513.42
Other income	13,439.47	13,623.91
Total income	699,455.52	504,137.33
Deductions from income:		
Interest on funded debt	324,115.98	312,638.59
Other deductions from income	113,121.62	104,314.22
Total deductions from income	437,237.60	416,952.81
Net income	262,217.92	87,184.52

Montana Power Co.

Earnings for the first 6 mo. were equal to $1.07 a share on the common stock compared with dividend requirements of $1.50. It is expected that earnings for the full year will be equal to or slightly more than $3 a share the present annual rate.

Pacific Power & Light Co.

	1921.	1920.
August gross	$ 269,702	$ 229,724
Net after taxes	120,629	103,026
Total income	122,125	103,666
Surplus after charges	64,137	53,381
12 mo. gross	2,930,075	2,459,890
Net after taxes	1,315,930	1,117,081
Total income	1,388,736	1,125,921
Surplus after charges	730,267	590,400

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Oct. 31.	Bid Nov. 7.
Adirondack Electric Power of Glenns Falls, common	6	12	12
Adirondack Electric Power of Glenns Falls, preferred	6	80	81
American Gas & Electric of New York, common	..	115	115
American Gas & Electric of New York, preferred	6	42	41
American Light & Traction of New York, common	..	96	93
American Light & Traction of New York, preferred	6	80	79
American Power & Light of New York, common	4	64	67
American Power & Light of New York, preferred	6	74	72
American Public Utilities of Grand Rapids, common	..	7	7
American Public Utilities of Grand Rapids, preferred	..	15	15
American Telephone & Telegraph of New York	9	109	109½
American Water Works & Elec. of New York, common	..	6	6
American Water Works & Elec. of New York, particip	7	15	15½
American Water Works & Elec. of New York, 1st preferred	..	60	60
Appalachian Power, common	..	5	5
Appalachian Power, preferred	7	50	51
Cities Service of New York, common	+extra	181	201
Cities Service of New York, preferred	6	55½	56½
Commonwealth Edison of Chicago	8	111	111
Comm. Power, Railway & Light of Jackson, common	..	8	8
Comm. Power, Railway & Light of Jackson, preferred	6	24½	26
Federal Light & Traction of New York, common	..	8	8
Federal Light & Traction of New York, preferred	..	60	60
Northern States Power of Chicago, common	..	48	53½
Northern States Power of Chicago, preferred	ex.div.7	79½	80
Pacific Gas & Electric of San Francisco, common	..	62	..
Public Service of Northern Illinois, Chicago, common	7	81	81
Public Service of Northern Illinois, Chicago, preferred	6	82	82
Standard Gas & Electric of Chicago, common	..	8	8
Standard Gas & Electric of Chicago, preferred	8	33¼	34
Tennessee Railway, Light & Power of Chattanooga, common	..	¾	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	5	5
Western Power of San Francisco, common	..	29	30
Western Union Telegraph of New York	..	83	84
Industrial—			
General Electric of Schenectady	8	128	133
Westinghouse Electric & Mfg. of Pittsburgh, common	7	44¼	46